WARSHIP COMMANDER

1967 - 1987
Present Day Tactical Naval Combat

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I. INTRODUCTION:

Warship Commander is a set of rules for recreating present day naval actions using military miniatures or cardboard counters. The rules can be used with military miniatures of any scale, although we recommend the new 1:3000 scale models. The game is designed to be played by two players or teams. Regardless of the number of players, **Warship Commander** is a thoroughly playable, highly detailed, and exceptionally realistic game.

Warship Commander is the culmination of three years of research into the weapons, tactics, and battle damage of World War II as well as in depth research into present day naval weapons and tactics. It is a highly detailed and unique game, and it is unlike any other naval game ever produced. Most of the game's mechanics will be as unfamiliar to the veteran naval wargamer as they are to the novice. For this reason, we strongly recommend that players learn the game gradually, adding in new complexities only after the basic ideas are mastered. We suggest that players should first learn to play surface actions using one ship per player, with neither side possessing torpedoes, electronics, or missiles. It will only be necessary to read through the rules sections up to and including Communications in this case. Once these basic rules are mastered, torpedoes should be included. Electronics should be added afterwards, and do not attempt to add missiles until the Electronics rules are thoroughly mastered. As the game becomes more familiar, the number of ships used by each player can be gradually increased. However, **Warship Commander** is highly detailed and is designed primarily for small-scale naval actions, therefore, we believe that the game is most enjoyable when the number of ships commanded by each player is kept rather small.

Since information on modern ships and weapons is not readily available, we have included a large section describing modern naval warfare and how it relates to the rules of the game. We recommend that all players read this section before reading the rules, as it will provide the information needed to thoroughly understand the rules. In order to play **Warship Commander** well, a player will need to thoroughly understand modern naval warfare, not just memorize a series of rules.

II. MODERN NAVAL WARFARE:

1. NAVAL DEVELOPMENTS SINCE WORLD WAR II:

When comparing present day ships with their World War II counterparts, one is immediately struck by the fact that World War II ships, usually bristling with armament, seem to be much better weapon systems then current day ships of similar size which frequently carry only one or two guns or missile launchers. Yet, modern ships are much more capable of fulfilling the traditional naval tasks than were their World War II counterparts, and in most situations, if a modern warship were ever to engage a World War II vintage ship in action, the World War II ship would have little chance of surviving.

Modern ships are the culmination of an evolutionary process in ship design that began with the development of the Dreadnought at the turn of this century. At that time, the gun was the main offensive weapon and the ships carrying the largest number of the heaviest guns, the battleships, comprised the main naval fighting force. This persisted until the beginning of World War II at which time it was realized that the most effective weapon in naval warfare at that time was the airplane. The aircraft carrier became the most important naval weapon, and the battleships were mainly relegated to shore bombardment and anti-aircraft support. In fact, in the major naval battles which involved aircraft carriers, the large guns were useless; the only effective ship borne weapons were the smaller anti-aircraft weapons. This resulted in a great increase in the number of small caliber guns carried by ships, and frequently, larger caliber gun mounts were removed from ships in order to make room for the small caliber AA mounts. Thus, the armament of ships began to change from a surface-to-surface role to a surface-to-air role; and the main purpose of ships other than aircraft carriers was being transformed from that of an offensive force into that of an anti-aircraft screen for the carriers.

Interestingly, in early World War II night actions when aircraft could not operate, the large caliber gun was still not the most effective weapon. Because visibility was greatly limited at night, medium and small caliber guns could be brought into the range where their rapid rates of fire more than made up for their shorter maximum range and smaller shell. In the first battle of Guadalcanal, US 8" cruisers and 5" destroyers succeeded in knocking a 14" gun battleship out of action. Although effective, even small and medium caliber guns were not as useful in night actions as was the torpedo. Even when aircraft could not operate, the gun was not necessarily the prime naval weapon in World War II.

Aside from revealing the importance of aircraft and, conversely, the decline in importance in gunnery, World War II also was responsible for two other developments which play a prominent part in current day naval warfare. The first of these was the usefulness of the submarine. Although relatively few in number and primitive by modern standards, the German U-boat in the first half of World War II was a serious threat to the allied war effort. The allies expended much time and energy against these vessels, finally defeating them primarily by using large numbers of aircraft to detect and attack them on the surface. World War II submarines had to spend most of their time on the surface and were very slow when submerged. Toward the end of the war, when it was too late to have an effect, the Germans developed snorkel-equipped submarines that seldom needed to surface and could travel almost as fast submerged as they could when surfaced. Such subs would have been very difficult to detect and could not have been defeated by the methods available at that time. Current day submarines are based on this type of design and constitute one of the most important types of vessels.

The other important development was electronic warfare. Electronic warfare began in World War II to combat the threat posed by aircraft and submarines. Radar was used from the earliest days of the war to detect aircraft well beyond visual sighting range. Later, a radar was developed which could detect surface targets, and finally, fire control radars were developed which could allow accurate firing against unseen targets at night or under conditions of poor visibility. The efficient US fire control radar was responsible for the great victory in Surigao Strait and it was an effective airborne search radar that enabled allied aircraft to defeat surfaced U-boats.

As radar became an effective weapon, countermeasures were developed against it. A device to detect radar emissions, called Metox, was installed on German submarines which enabled submarines to detect airborne radar beyond the effective range of the radar. This was later countered by an airborne radar which operated at a frequency which the Metox could not detect. The Japanese had a similar device by 1943 which they used in the battle of Kula Gulf.

In addition to detecting devices, other equipment was developed which would make the radars ineffective. "Window", or "chaff", consisted of aluminum strips cut to half the length of the opposing radar frequency. This would reflect most radar signals back to the transmitter, resulting in an electronic "smokescreen" behind which aircraft could escape radar detection. Later, "noise" jammers were developed. These were basically radio transmitters that would broadcast a loud noise on the frequency at which the opposing radar is operating. Since radar receives range information by measuring the time it takes for a sound wave to travel from the transmitter, echo off the target, and return to the receiver, it should be clear that radar will be unable to determine range if it is continually receiving a broadcasted signal, since it would be unable to distinguish the broadcasted signal from the echo. These jamming techniques were used much more extensively than most people realize. Chaff was used throughout most of the war in both the European and Pacific theaters; ultimately, 20,000 tons of chaff was produced. Noise jamming began in 1943. The 8th Air Force used noise jamming to great effect in their bomber offensive, greatly reducing their losses. Many ships were equipped with jammers which successfully defeated the threat created by German glide bombs. Since the war, a great deal of time and energy has been expended on the development of electronic warfare; it is one of the most important components of modern naval warfare.

During the war, guided missiles were developed. Subsequently, most countries found that these weapons made ideal anti-aircraft weapons since they could be fired to extremely long ranges (twenty miles or more) and had good accuracy even at long range. The development of the surface-to-air guided missile eliminated the need for most guns since missiles were much more effective against aircraft than guns could be. Guns now became secondary weapons, useful only for shore bombardment and as a back up for the main weapon systems.

Precision guided weapons led to further developments in the electronic equipment used by ships. Modern long range missiles are incapable of operating without radar guidance, and in addition, in order to take advantage of the long range of such weapons, long range search radars became more necessary. For this reason, more and better radars were installed on ships. Of course, as electronic detection and fire control systems became more important, the need for electronic countermeasures arose.

Modern weapons rely on electronic sensors, and electronic warfare is perhaps the most important element of modern warfare. The side that controls the electromagnetic spectrum will be the side that will win the next war at sea. All navies constantly improve their radars and similar sensors to make them more resistant to electronic countermeasures, while also improving their own electronic countermeasure devices to make them more effective against opposing radars. The electronic battle, called "The Wizard's War" by Churchill, is no less real in peace time.

The development of computers has also affected naval weapons. In

World War II, mechanical computers were used to compute firing solutions for shipborne weapons. After World War II the much faster analog computer was developed. The computers on most modern ships are analog. Recently, the digital computer, was developed. It operates faster than the analog computer, thus increasing accuracy. As computers improved, combat procedures became more automated. Currently, several countries are working on a completely automated fire control system; the computer will automatically direct the appropriate weapons against any enemy target detected by radar or other sensors without any human finger on the trigger or order being given.

Another recent development that has had a great effect on modern naval warfare was the development of the surface to surface missile. These were developed in the 1950's and provide an accurate anti-shipping weapon to navies without aircraft carriers. Even the US, which has a large number of aircraft carriers, now uses a surface to surface missile. Surface to surface missiles (SSM's) are usually difficult to detect at long range, and are available in such large numbers that it is very difficult to defeat them with the essentially long range, slow firing surface to air missiles. The most effective weapon against SSM's is the small and medium caliber anti-aircraft gun. Thus, the development of anti-shipping missiles has revived interest in naval guns. Many ships built in the 1950's treated guns solely as a secondary weapons system; guns on modern ships are an integral part of the ship's main defensive system.

Improvements in communications have also had an effect. One significant development has been the development of data link. Data link is a direct communication link between computers which allow many ships to be immediately aware of all of the information available to the sensors of all ships. This data is accurate enough to allow firing — ships having data link are able to fire accurately against targets not actually detected by their own sensors. Another important development is communication by satellite which is much more difficult to detect (and jam) than normal radio communications. Satellites are also capable of detailed reconnaissance over wide areas, greatly increasing the ability of task forces to detect and intercept each other. Surprise attacks will probably be a rarity in modern war.

Modern naval weapon systems are radically different from World War II weapon systems, relying on great accuracy rather than volume of fire. For this reason, modern ships have much fewer weapons, but these weapons are much more effective than earlier weapons. The most effective weapon against ships is still aircraft, but now surface-to-surface missiles provide great combat power for those countries without aircraft carriers. SSM's may result in the revival of effectiveness of ships other than carriers. Until these missiles appeared, frigates, destroyers, and cruisers in the US Navy were relegated to the secondary function of providing anti-aircraft and anti-submarine support for carriers. SSM's allow such ships to again be useful in surface to surface actions.

2. MODERN U.S. SHIP DESIGN:
Throughout the 1950's and into the 1960's, the U.S. Navy built ships conforming to the developments experienced in World War II. The main striking force was concentrated in the large aircraft carriers; all other ships existed to sink submarines and protect aircraft carriers from aircraft which might succeed in evading the carrier's combat air patrol. Thus, most surface ships built after the war were armed with several surface-to-air missile launchers, sonar and anti-submarine weapons, and only one to four guns of either 3" or 5" caliber, usually mounted on the side. One ship, the **Long Beach**, was originally completed without any guns at all, but later, two obsolete 5"/38 were mounted on it due to pressure from Washington. The differences between types of ships began to disappear. Cruisers as well as destroyers were equipped with anti-submarine weapons, and destroyers became about as large as cruisers. Improved radars were developed. Surprisingly, the US did not make a great effort to improve its electronic countermeasures equipment, apparently believing that their ships were armed with enough "hard Kill" weapons to make ECM equipment unnecessary. Even today, the ECM equipment on most US ships is inadequate to the demands of modern naval combat.

Recently, US Naval philosophy has begun to change. Due to great increases in Soviet naval strength, the US Navy has apparently become worried that its reliance solely on the aircraft carrier and "hard kill" weapons might be misplaced. There can only be a limited number of aircraft carriers, currently thirteen, and they cannot be everywhere at once. The proliferation of the surface to surface missile, which can knock most ships out of action with a single hit, has increased the danger to the carriers, and the large number of such missiles available to the Soviets makes it unlikely that all threats could be defeated by "hard kill" weapons alone. For this reason the US Navy has recently begun a program to improve the effectiveness of its smaller ships. To increase the ability of the ships to defeat missiles, an automatic 20mm Vulcan AA cannon, the Phalanx, will be installed on many ships. An improvement to the ECM suite carried on board ships called DPEWS, is beginning. Improved fire control systems, using digital computers, have been installed on some new ships which will enable them to respond quickly to any missile threat. Finally, the US Navy has developed its own surface to surface missile, the Harpoon, which is being installed on frigates, destroyers, and cruisers. Modernized US Navy ships are again capable of engaging surface, sub-surface, and air targets without the aid of aircraft carriers.

3. MODERN SOVIET SHIP DESIGN:
Until the 1960's, the Soviet Navy was rather weak. It had no aircraft carriers, and in fact, no prior experience with carrier operations, and its main force of cruisers and destroyers was no match for the Western navies. Recent developments have changed this. In the late 1950's and early 1960's, the Soviet Navy, to some extent, overcame its lack of aircraft carriers by developing long range anti-shipping missiles and installing these weapons on heavy bombers and newly built cruisers, destroyers and missile boats. These missiles, some with ranges of over a hundred miles, gave Soviet ships and aircraft greater striking capability than any Western ship, other than the carriers, and made them a threat to Western naval operations. More importantly, however, the Soviets greatly enlarged their submarine fleet, adding nuclear powered submarines armed with ballistic nuclear missiles, submarines designed to sink other submarines and submarines designed to attack ships, a type largely extinct in the West. Currently, the Soviet submarine fleet is the largest in the world. The Soviets view their submarines in the same manner that the US Navy views its aircraft carriers. These are the ships having the greatest value, and will be protected at all costs. Any naval war involving the Soviet Union would surely involve anti-submarine warfare to a very great degree, and it could very well be the decisive element in the naval war.

The Soviets have recently begun building aircraft carriers, but these carriers differ greatly from their Western counterparts. While Western carriers are large, and carry a very large number of the most advanced aircraft, Soviet Kiev class carriers are fairly small, carry a relatively small number of low performance VSTOL aircraft and/or helicopters, yet are heavily armed with anti-air missiles, surface to surface missiles, and anti-submarine weapons. The Soviet carriers, while no match for Western carriers, still seem to be able to perform a large array of functions, and are probably extremely good at anti-submarine warfare. Their main purpose is still unknown.

4. EUROPEAN NAVIES:
In many ways, the navies of Western Europe are somewhat more advanced than the US Navy. While the US Navy could afford to build large aircraft carriers, the Western European countries could not, so instead, they concentrated on building improved smaller ships. Western European navies concentrated on developing electronic countermeasures and have succeeded in designing more effective equipment than that available in the current US Navy. Also, Western Europe navies have developed and widely deployed a number of advanced surface to surface missiles, such as the Exocet and Otomat. Most of the European ships built within the last ten years or so are equipped with such missiles. Although the Western European navies would have difficulty coping with a large scale attack, they should be very useful in small scale battles and anti-submarine warfare.

5. SHIP DESIGN:
Present day ships are designed to tolerate more battle damage than their World War II predecessors. Most present day vessels can withstand a great amount of underwater damage without sinking due to improvements in compartmentalization. Soviet ships are not as well compartmented as NATO vessels, while British and Canadian ships are particularly well compartmented.

A controversial feature found on recent US frigates, destroyers and cruisers is the use of aluminum in super-structures. While aluminum greatly reduces weight, it also reduces the ability to absorb damage. Aluminum is particularly vulnerable to fire because it melts at a much lower temperature than steel. The British and Canadians refuse to use aluminum at all, preferring steel for both superstructures and hulls.

In one respect Soviet-designed ships are superior to NATO ships. Roll stabilizers have been fitted on approximately 70% of Soviet destroyers and frigates, while such devices have been installed on only about 30% of American destroyers. Roll stabilizers greatly reduce the effects of heavy seas on a ship, thereby reducing crew discomfort and increasing combat effectiveness. In rough weather, most small Soviet ships will operate more effectively than most NATO vessels of a similar size.

Since World War II, there has been some experimenting with new types of hulls for patrol boats and small ships. The new types of hull designs include hydrofoils, hovercraft, and surface effect ships.

Hydrofoils are boats whose hulls are designed to lift out of the water at high speed. Contact with the water is retained only by the foils protruding from the bottom of the hulls. Reducing the amount of hull that is actually in contact with the water greatly reduces the amount of drag. For this reason, hydrofoils are capable of very high speed (frequently around 50 kts) with relatively small engines. Also, since only a small part of the craft touches the water, the effects of heavy seas are greatly reduced. Hydrofoils are very stable in bad weather, much more so than conventional boats of similar size. Hydrofoils can operate in a conventional mode, but the relatively small size of their engines makes them very slow.

Hovercraft are vessels equipped with giant fans which create an air cushion on which the vessel flies. When moving, hovercraft never actually touch the water; drag is reduced to zero. For this reason, hovercraft are capable of extremely high speeds; some hovercraft can move at 100 kts. Hovercraft should be very useful in amphibious warfare due to their high speed and also to the fact that shallow water is no obstacle to them. Hovercraft also have a limited ability to travel over small patches of land as well as water.

Surface effect ships are very similar to hovercraft and also travel on a cushion of air. The main difference between hovercraft and surface effect ships is that the "hulls" of hovercraft are usually made of rubberized canvas, while surface effect ships have rigid hulls. Surface effect ships having a much greater displacement than hovercraft are capable of being built. As with hovercraft, surface effect ships are capable of extremely high speeds.

6. PROPULSION SYSTEMS:
As in World War II, most large modern ships are propelled by oil burning steam turbine engines. Steam engines can produce fairly high power and are economical on fuel if cruising speed is not exceeded. However, as the speed of a ship increases, the amount of power required to increase the speed also increases but at a disproportionate rate. The amount of power required for a ship to accelerate from 90% of its maximum speed up to its maximum speed is about the same amount that is required for the ship to accelerate from 0 up to 50% of its maximum speed. Thus, steam turbine engines must greatly increase fuel consumption whenever the cruising speed is exceeded. Other main disadvantages of steam turbines are slow acceleration rates, and the fact that it takes several hours to start up an engine.

Nuclear powered ships also have conventional steam turbines, but use nuclear power rather than oil as their source of fuel. Unlike oil, nuclear fuel is not expended and nuclear powered ships have a practically unlimited range and can travel at their maximum speed practically at all times. Since nuclear fuel is not expended, there is no need to conserve it to increase range.

While steam turbines are common for large ships, they are bulky and inefficient for small ships. The most common propulsion system for smaller ships is the diesel engine. These engines, similar to large truck engines, can provide enough power for small ships to enable them to move about as fast as the larger ships. In addition, diesel engines can be started up in only a few minutes, and have a very rapid acceleration rate. As with steam engines, fuel consumption greatly increases as speed increases, so diesel-powered ships normally cruise at less than maximum speed.

A new development in naval propulsion has been the development of the gas turbine engine. Gas turbines are modified jet aircraft engines, characterised by very rapid acceleration rates and high power. A ship propelled by gas turbines can accelerate from a full stop to its maximum speed in about one minute. Gas turbines are suitable for use in large ships and have already been installed on the US Spruance class and Soviet Krivak class destroyers.

The main disadvantage of the gas turbine, and what has hindered its development for many years, is the fact that the amount of fuel expended does not decrease to any large extent as the speed decreases. Gas turbines expend large amounts of fuel at low speeds as well as at high, and ships equipped with gas turbines usually have a much lower range than other ships. In order to overcome this disadvantage, many ships were built with two sets of engines, one set for cruising and gas turbines for high speed operations. The type of propulsion systems carried by such ships is designated by the abbreviations COSAG, CODOG, CODAG, etc. In the abbreviation, the CO stands for combined. The letter following CO refer to the type of cruise engines: S means steam turbine, D means diesel, and G means gas turbine. This is followed by O or A. "O" stands for "or"; in such ships, only the cruise engines are used at low speed, and when high speed is desired, the cruise engines are turned off and the high speed engines are used exclusively. "A" stands for "and"; in such ships the cruise engines remain on during high speed and their power is added to that of the high speed engines. Finally, the last letter refers to the type of engine used for high speed operations; as before, S means steam, D means diesel, and G means gas turbine.

It might appear that systems using one set of engines for cruise only and another set for high speed operations are less efficient than those which use both sets during high speed operations. This is not the case. In order to use two different types of engines simultaneously, a very heavy and expensive set of gears is required; frequently, the advantage of using all of the engines simultaneously is more than offset by the additional weight and expense. Incidentally, ships having all gas turbine propulsion usually have two different types of gas turbine engines, one designed for low speed (and some fuel economy) and the other designed for high speed. The engines of the Spruance class are of this type, which can be abbreviated COGAG.

7. FIRE CONTROL:
During World War II, fire control solutions were usually plotted by a mechanical computer. Later, analog computers could provide a more accurate solution as less time was required for its calculations. Recent digital computers are even faster than analog, thereby providing greater accuracy and shorter response times. In the game, units are given a fire control rating from A to H which represents the effectiveness of its fire control system. An "A" system is a fully-automated system based on a modern digital computer. Such systems automatically detect and fire upon targets without the need for human interference, and are the most accurate and fastest systems available. Few ships have all A systems, but many ships have secondary weapons which have their own self-contained fire control systems rated A. The Vulcan-Phalanx and Soviet 23mm systems are examples of "A" rated secondary weapon systems. "B" systems are modern manual fire control systems based on digital computers. These systems are somewhat slower and less accurate than A systems, but they are still extremely effective. The US MK86 system installed on the **Spruance** class is an example of a "B" system. "C" systems are systems built around early digital computers or the most modern analog computers. "D" systems are older than "C" systems and are built around analog computers. The US MK68 system is a "D" system as are most Soviet systems. An "E" system is a system based on a very early analog computer. Some old Soviet ships have "E" systems. An "F" system is actually similar to a "D", being built around similar analog computers, but where "D" systems are designed primarily to deal with surface targets, "F" systems are designed to engage air targets. "F" systems are inaccurate against surface targets but are more accurate than "D" systems when engaging fast moving air targets. The US MK56 system is an example of an "F" system. A "G" system is a World War II system based on a mechanical computer. The "H" system is actually no system at all; it is local control. All units which do not have an operating computer must use the accuracy rates and response times given for H systems.

Fire control systems accept data received by visual sighting and by electronic sensors and compute firing information that is then transferred to the appropriate weapon. The systems are, of course, greatly dependent upon the data gathered by electronic sensors and visual sighting since incorrect data will result in a false solution. Most fire control systems are designed to obtain information primarily from fire control radars which, under most conditions, provide the most accurate data. However, if the fire control radar is not operating or if it is jammed, data can be obtained from search radars and by the visual sighting of the gun director, but such data is not as accurate as that obtained from a fire control radar. If search radars and the main director are knocked out, the fire control system cannot function.

After processing the data, the fire control solution is used to direct the proper weapon to the correct position. This is done automatically. The fire control solution will take into account practically every factor which affects accuracy including temperature and the pitch and yaw of the firing platform. After firing begins, the computer continues to calculate data received to update the firing solution.

A ship's fire control system is at the heart of its combat capability. If the computer sustains damage or if all active sensors and directors are knocked out, the system cannot function. Also, most NATO ships concentrate the consoles controlling the radars and weapons in the Combat Information Center (the CIC). If the CIC is hit, the fire control system cannot function. On many NATO ships, the CIC is well below the waterline, but on most US ships, the CIC is in the superstructure, a more vulnerable position. Soviet-designed ships do not have a concentrated CIC as NATO ships do, but rather the control consoles are located in various parts of the ship, so Soviet ships will not lose all of their weapons should the CIC be hit. However, the dispersal of the control centers makes the command process more difficult, increasing the amount of time needed to respond to a threat.

8. GUNNERY:
Gunnery is much more accurate today than during World War II due primarily to improvements in the fire control systems. In World War II,

most firing was done slowly so that the fall of shot could be spotted and the firing solution corrected. In modern gunnery, spotting the fall of shot is not very important, and guns can fire at their maximum rate at all times, limited only by ammunition supply.

The maximum rate of fire of modern guns has increased over that of guns from earlier periods. Most modern guns are loaded automatically and those that are not have improved machinery that aids in loading. All of this increases the maximum rate of fire. Some guns have no crew at all, while other guns have a crew to supplement the automatic loading system. Interestingly, gun crews for short periods of time can load guns faster than the automatic loader, and can double the rate of fire of a gun for several minutes before exhaustion slows them down, at which time the automatic loader will take over. In an emergency, a ship having a gun that can be manually loaded has an advantage over ships having purely automatic weapons.

In addition to being more accurate and having higher rates of fire, modern guns have one other advantage over earlier weapons. Modern gun ammunition is generally heavier than World War II ammunition, and improvements in explosives have also made them capable of causing more damage. For example, a modern 5'/54 HE will cause about as much damage as a World War II 6" HE round. Improved fuses make modern gun rounds more reliable against both surface and air targets.

Should modern ships come to within gun range of each other, improved accuracy, high rates of fire, and improved explosives guarantee that a great deal of damage will be sustained within a very short period of time. Therefore, any damage sustained by the gunnery system of a ship involved in such an action could well be decisive.

9. TORPEDOES:
Torpedoes are no longer an important anti-shipping weapon due to their short range. Most current torpedoes are designed for sinking submarines, so are acoustic homing and have rather small explosive charges. While some ships, especially Soviet ones, carry torpedoes which can be used against both submarines and surface targets, most do not. The MK46 torpedo carried on most US and many NATO ships is not capable of being used against surface targets; its minimum depth is well below the depth at which it can strike or damage a ship. Most submarines still carry a few anti-shipping torpedoes, but these are frequently old World War II models, useful primarily for self defense.

There are three basic types of torpedoes; straight running, pattern running, and wire guided. Straight running torpedoes will move in the direction they are launched until they either hit a target or reach their maximum range. Pattern running torpedoes will move in a pattern, frequently elliptical, until they detect and home in on a target. Wire guided torpedoes are connected to the launching platform by a thin wire along which the launching unit can transmit guidance information. Wire guided torpedoes can be steered by the firing unit.

Torpedoes may either be non-homing or acoustic homing. Non-homing torpedoes cannot detect targets and will hit a target only if it intercepts it. Acoustic homing torpedoes are equipped with sonar and can detect targets. If the torpedo's sonar detects a target, the torpedo will automatically steer toward its sonar contact and attempt to hit it. Non-homing torpedoes are used only against surface targets; acoustic homing torpedoes are used against submarines and occasionally against surface targets. Acoustic torpedoes are the most effective weapon against submarines since they are relatively fast, can dive to deep levels, and can detect and home in on submarines very accurately. They are less useful against surface ships because only about two torpedoes can be fired in one direction at the same time. If more were fired, the torpedoes would begin homing in on each other. Also, frequently these torpedoes home in on the wake of ships, since sonar waves bounce off the wake. Finally, acoustic torpedoes can be deflected by towed noise makers ("foxers") which are carried by many ships (and submarines).

10. MISSILES:
The most important weapons carried on modern ships are missiles. There are two types of missiles: anti-aircraft missiles (called SAM's) and surface-to-surface missiles (called SSM's). Aircraft frequently are equipped with air-to-surface missiles (ASM's) which are similar to SSM's. SAM's are designed to shoot down air targets. They are very fast, with a relatively long range and small warhead. Most SAM's are semi-active homing; that is, they mount a small radar in the nose which homes in on targets tracked by a missile guidance radar mounted on the firing ship. A SAM target must first be detected by radar or visual sighting. The SAM's ship-mounted guidance radar is then locked-on to the target and will automatically track the target. The missile is then launched. In its nose is a radar receiver which receives the guidance radar's signals that "echo" from the target, and the missile will automatically fly to intercept the source of the echo. Modern SAM's are extremely accurate.

Some smaller short range SAM's are equipped with an optical tracking system which enables them to engage targets without radar assistance provided the target can be visually tracked from the launching platform.

Many SAM's can be used against surface targets but are not very effective in that role as they have an arcing trajectory which is ideal for engaging air targets, but it results in the fact that the SAM's can hit surface targets only within a very limited area. Also, the SAM's warheads are small, to reduce weight and increase speed.

SSM's and ASM's are designed solely to engage surface targets and are completely ineffective against air targets. They have very large warheads, and, when compared to SAM's, rather low speeds (generally Mach .9 for surface skimmers). Most SSM's and ASM's are active homing, that is, the missiles themselves contain all of the equipment needed to acquire a target. SSM's and ASM's can acquire targets by one of the following methods:

a. Radar: Radar homing missiles are equipped with a radar which detects the target.
b. Anti-radiation: Anti-radiation missiles are equipped with radar receivers and will detect and acquire targets using radar.
c. Infra-red: Infra-red homing missiles detect the heat radiated by ships, and they home in on the largest source of heat.
d. Home on jamming: Missiles designed to home on jamming can detect the presence of "noise" jamming and will home in on the source of this jamming.

The homing heads of some missiles can operate only for short periods of time. Before such missiles can be launched, they must be programmed to turn on their homing heads at a time when the target will be within the area searched by the homing head. In order to accomplish this, the firing unit must track the target with a proper fire control radar. The computer will calculate the target's course and determine the time the missile's homing head should activate. This information is immediately programmed into the missile which can then be fired.

The homing heads of some missiles can operate for much longer periods. Such missiles may be programmed to begin searching for targets as soon as they are launched, and they will continue searching until they acquire a target or reach their maximum range. Before these missiles are fired, it is not necessary for the firing unit to track the target, and the firing unit may even launch such missiles at targets whose bearing is known but whose range is unknown. Missiles fired in this manner are less accurate than those programmed to intercept a target that has been tracked by a fire control radar, because missiles fired at untracked targets must be set to search a very wide area. Since missile homing heads can search only a small section of such areas at one time, it is possible for the missile to pass by the target without detecting it.

Some missiles have the capability for mid-course guidance. This means that the course originally programmed into a missile can be altered, after it is fired, by a unit having the proper radio equipment. Mid-course guidance is a feature found on all long range missiles. The missile can be fired in the general direction of the target, then when it approaches the vicinity of the target, friendly ships, aircraft, or helicopters can track the target and transmit the accurate data to the missile. Missiles without mid-course guidance cannot be re-programmed after firing.

In order to have sufficient time to plot an accurate intercept course, the target must be detected by the missile thirty seconds before it reaches the target's position. For this reason, targets which are less than thirty seconds away from the missile at the time its homing head activates may not be acquired by the missile.

After a missile acquires a target and begins homing in, it can be defeated by electronic countermeasures (ECM) or shot down. For such action to be taken against a missile, the missile must be detected by the opposing force as early as possible. A missile can be detected by radar or visual sighting. In addition, radar homing missiles can be detected by radar detectors as soon as their homing heads activate. To avoid detection for as long as possible, many missiles are designed to fly at surface skimming altitude (usually five to ten meters above the water) which, combined with their small size, makes them difficult to detect. Whenever possible, the homing heads of radar homing missiles are not activated until the last possible moment in order to prevent early detection by radar detectors.

Once an SSM or ASM has been detected, all hell breaks loose on the opposing ships. Warfare has often been described as hours of boredom punctuated by minutes of sheer terror. In modern naval warfare, the terror is more intense than ever before in the history of war. Modern captains must make a split-second decision to defeat

threats that often move at supersonic speeds. Remember that the Soviet Navy will, whenever possible, attack with aircraft, submarines, and ships using SSM's, ASM's, torpedoes, bombs, and guns, all coordinated to arrive within a 90 second period, saturating the defenses. NATO captains have 90 seconds to deal with all of these threats.

In most situations, approximately thirty seconds is required for a ship to respond to a missile contact, although automatic equipment (e.g. Fire control systems rated A) can greatly reduce this reaction time. Frequently, there are only a few seconds available before the missile strikes its target, but this is sufficient to engage the missile successfully. The proper ECM can quickly draw a missile away from a target, and three second of firing against a missile at close range can frequently shoot it down.

When attempting to defeat SSM's by ECM or weapons, it is important to realize that not all of such weapons and equipment is effective against all missiles. Home on jamming and anti-radiation missiles can be defeated by turning off jammers or radars; other ECM devices are ineffective against such missiles. Infra-red homing missiles can be defeated only by flares. Radar homing missiles can be defeated by chaff and deception jamming; noise jamming is ineffective against **homing** missiles since it merely denies range information, not bearing information, and a moving missile really does not need range information in order to hit its target. Guns are usually effective against most missiles, although some missiles are designed to fly above the maximum range of guns. Surface to air missiles are effective against missiles flying at high altitude, but less so against surface skimming missiles because their guidance radars are not designed to pick up targets against a background of sea clutter, and their arching trajectories greatly increases their minimum range against such very low targets. The fairly large minimum range of most SAM's usually limits their effectiveness to high angle missiles which can be detected at long ranges.

If a missile is not defeated by ECM or weapons, it usually has a very high chance of hitting its target, although early Soviet missiles have great difficulty in hitting small targets. Since SSM's have very large warheads, they can do a great amount of damage. High angle missiles usually do more critical damage than surface skimmers because they dive into a ship and penetrate deeply into its vitals before exploding. For this reason, some normally surface skimming missiles, such as Harpoon and Otomat, are designed to pop up and dive onto their targets at the end of their flight. The surface to surface missile is the prime weapon against ships and it is constantly being improved to make it more accurate and less susceptible to opposing ECM and weapons.

11. ELECTRONIC WARFARE:

Modern warfare **is** electronic warfare. The side which controls the electromagnetic spectrum and denies its use to the enemy will be the winner of the next war. A ship unable to use its electronic sensors is helpless, unable to strike at the enemy or repel his blow.

The first component of electronic warfare is radar. Shipboard radars are of two basic types: search and fire control. Search radars have a broad beam and are designed to detect targets at long ranges. All search radars can search 360°. Most do this by rapidly rotating and sweeping the surrounding area with its beam. A recent development has been the fixed array radar in which the antennas are built into the superstructure of the ship. Such radars do not rotate but are still capable of a 360° search. Fixed array radar, while being very expensive, has a larger range than rotating radars.

Radar beams do not follow the curvature of the earth; they are direct line of sight and cannot detect units that are over the horizon, though beams do bend slightly and the radar horizon is therefore slightly farther away than the visual horizon. The distance to the radar horizon is based on both the height (or altitude) of the searching antenna and the size or altitude of the unit for which the radar is searching. We have computed the radar horizons for various sized ships and for different altitude levels and the results of the calculations are given on the Radar Detection Table.

The frequency at which the radar operates has a great bearing on its effectiveness. Low frequencies produce very long ranges and are used for high altitude air search radars where the distance to the radar horizon can be very long. High frequencies produce shorter ranges but greater reflection from small targets. High frequencies are used for surface search radars where the maximum range is limited by the radar horizon. Although air search radars and surface search radars are basically different, their functions overlap slightly. Some air search radars can detect surface targets at close range, while surface search radars can detect low flying aircraft.

Air search radars are divided into two basic types: 2D and 3D. Since aircraft operate in a three dimensional environment, it is important to discover their range, bearing and altitude. Normal air search radars are two dimensional and can only determine range and bearing. This information is not sufficient to allow firing at the target. In order to obtain altitude, another radar is needed. Some ships use a separate height finding radar which can determine altitude and range only. When a target is detected by the air search radar, the height finder is directed at it to determine the altitude. Other ships have three dimensional air search radars which can detect range, bearing, and altitude simultaneously. Such radars are more effective than the two dimensional search radar and height finder combination, but they are very expensive and bulky. Ships equipped with 3D radars are also equipped with normal 2D air search radars because the maximum range of a 3D radar is much less than that of a 2D radar, as the antenna required by the 3D is much larger than that required by the 2D, so a long range 3D radar would have a prohibitively large antenna.

The second main type of radar is the fire control radar. While search radars have wide beams in order to search a wide area, fire control radars have narrow "pencil" beams, which concentrate the energy into a narrow beam so they can obtain the highly detailed range, bearing, and speed information necessary for the use of weapons. Because of their narrow beam, these radars must be pointed directly at a target or they will be unable to detect it. For this reason, fire control radars can only be used against targets that have already been detected either by visual sighting or another radar. Occassionally, if a target has already been detected by a passive detector, a fire control radar may be pointed toward the target's bearing and used to search for it, but frequently, the radar will still be unable to detect the target due to its narrow beam.

Recently, the search and fire control functions have been combined into a single radar set, called a track-while-scan (TWS) radar, which can search an area while at the same time, sending a "pencil" beam out toward targets it detected. While a fire control radar can track only one target at a time, TWS radars can track a rather large number of targets simultaneously in addition to performing a search function. Current TWS radars are essentially two dimensional and so cannot track air targets. In addition, for tracking single targets, TWS radars are less efficient than fire control radars because the energy in TWS radars is used to search as well as track, while the energy of a fire control radar is concentrated at one point. For this reason, information provided by a TWS radar is less accurate than that provided by a fire control radar and it takes the TWS radar longer to acquire the information. The dispersal of the energy of the TWS radar into both searching and tracking also makes it more vulnerable to ECM.

The second element of electronic warfare is the radar detector. Radar detectors are receivers designed to intercept radar signals and determine its frequency, pulse repetition rate, and other information which would allow the radar to be identified. Early radar detectors, many of which are still used today especially by the Soviets and Americans, scanned each frequency individually in order to determine if any radar was being used. If one was detected, it would provide the information indicated above, as well as the relative bearing of the radar source. The crew would then check data books to determine which radar fit the information received. Thus, while radar impulses would be detected fairly rapidly (in about a few seconds) and its type (search or fire control) could be readily determined, it could take up to about five minutes or so before the exact name of the radar would be identified. Modern digital radar detectors search all frequencies practically simultaneously. The detector's computer stores information on **every** known radar. When a radar is detected, the computer searches this information to determine the name of the radar it detected. Thus, modern radar detectors can provide the type of all detected radars within a very few seconds after detection, and in all respects provide the necessary information much faster than earlier equipment. All radar detectors are capable of detecting radars well beyond the effective range of the radar itself. This is because the radar scatters "noise" over a much larger area than the area it can actually search. This noise can be detected and the radar can be identified by it. The noise will even "spill" over the radar horizon thus, allowing a unit to detect a radar beyond the horizon. Most ship radars can be detected at a distance equal to about two to three times the maximum range of the radar, while airborne radars can be detected out to about five times their range.

ESM, the process of detecting electronic emissions, is as important in peace time as it is in war. Currently, NATO and Soviet ships are attempting to gather as much information as possible on their opponent's radars. This information will be used to update radar data books and computer programs to enable more accurate determinations of radar types and functions. Each radar set has a unique electronic "signature" that is slightly different than that of any other radar set, even other sets of the same type. Modern ECM equipment is making it possible to often determine the actual name of the ship itself just by detecting one of its radar emissions.

The information provided by radar detectors is so valuable that current

NATO and Soviet doctrine calls for ships at war to turn off all radars except when absolutely necessary. By remaining in this condition, called EMCON, the ships will avoid revealing their positions prematurely. As some missiles can be fired off information provided by radar detectors alone, detection could be devastating. Thus, in a modern war ship-borne radars will be used infrequently and only when necessary; both the US and Soviet Navy will rely on aircraft radars for early detection of opposing forces.

The third element of modern electronic warfare is electronic countermeasure or ECM. ECM are techniques and devices designed to deny to the opposing force the use of their radars. ECM techniques include noise jamming, deception jamming, and the use of chaff, decoys, blip enhancers, and reflectors. Nearly all ships carry some form of ECM equipment. Most carry jammers that are capable of both noise and deception jamming, and many also carry chaff launchers. Reflectors and decoys are not widely used.

Noise jamming involves broadcasting noise at the frequency the opposing radar is operating. When noise jammed, a radar will be unable to distinguish the target echo from the broadcasted signal; so instead of a "blip" occuring on the radar screen at the position of the opposing unit, a large white strobe will appear which blanks out the entire section of the screen in the direction of the jamming. By reducing gain, the width of the strobe can be reduced to that of a thin line across the screen from its center out to the edge in the direction of the jamming. Thus, noise jamming will deny range information, but will always reveal the relative bearing of the jammer. At close range, radar signals are stronger than jamming signals, and noise jamming becomes ineffective, as the radar "burns through" the jamming.

If a noise jammer is operating on a single frequency, it is easy for the jammed radar's operator to simply tune the radar to another unjammed frequency. To prevent noise jamming from being defeated so easily, jammers are designed to operate in several different ways. The first method, described above, is called spot jamming; the jammer's energy is concentrated on only one frequency. Jammers can also operate in a barrage jamming mode. Barrage jamming is the opposite of spot jamming; in barrage jamming, the energy of the jammer is spread over a large number of frequencies. Thus, barrage jamming produces a weaker signal than spot jamming, but it simultaneously jams a much larger number of frequencies. Another technique, called swept jamming, is intermediate in effect. In swept jamming, a concentrated jamming signal is swept across a larger number of frequencies, one after another. In the game, it will not be necessary to choose the mode of jamming because we have based the effect of noise jamming on the best type of jamming that can be used under the various circumstances. In the game, a ship having a modern radar detector also gets better results with its noise jammer. Such radar detectors unlike earlier detectors, can give more accurate and current information on the frequencies being used by the opposing radar, enabling the crew to tune its noise jammer to only those frequencies, rather than being forced to spread the jammer's energy over a wider area.

The other basic type of jamming is deception jamming. A deception jammer records the radar impulses it receives and re-transmits them after a short delay. Thus, the opposing radar receives not only the target echo, but also the re-transmitted signal which appears on the radar screen as another target echo. Modern deception jammers are capable of producing a number of echos at any range and bearing desired. The false targets can even be made to appear to move. False target generation can be very effective, however, a good radarman can frequently distinguish false targets from actual targets. As the fire control radars have a very narrow beam that is directed at a very small area, it is not practical to attempt to create a number of false targets for them. However, a similar technique, called range or velocity gate pull off, is very effective against fire control radars. When a fire control radar has locked onto a target, that target, or any other unit within the radar's beam, may use the deception jammer to generate a false echo that slowly moves away from the target. The radar frequently follows the false echo. When the radar's beam is moved far enough away from the target, the jammer is turned off, and the radar's tracking attempt is broken.

Chaff is a very widely used and effective ECM. Chaff consists of aluminum strips cut in such a way as to reflect the opposing radar signals. Chaff can actually perform two functions: it can create a "cloud" sufficiently large enough to hide a unit from radar detection, and it also can create a large number of ship-sized echos. Chaff therefore performs a function similar to that of both noise and deception jamming and is therefore useful against both search and fire control radars. In actual fact, chaff is more useful against fire control radars because their narrow beams can easily be captured by chaff. To be really effective against a wide beam search radar, the chaff would need to be very evenly distributed over a wide area and in practice, this seldom occurs. Many radars carry devices which can cancel out chaff echos, and a good radarman can distinguish a chaff echo from a real target echo. Chaff, however, is particularly useful against radar homing missiles, since the missiles obviously have no "radarman" and have great difficulty distinguishing a chaff echo from a target echo.

An ECM device which is used to some degree is a blip enhancer. Blip enhancers are electronic devices which greatly increase the size of the unit's radar echo, thus, for example, making helicopters or small boats appear as large ships on the opposing radar. The Israelis used blip enhancers very effectively in the 1973 war using helicopter-mounted blip enhancers to attract the SS-N-2 STYX missiles. The missiles locked onto the helicopters, which would then climb rapidly. The missiles were unable to follow this maneuver and fell into the sea. Some ships and aircraft may carry radar reflectors which are mechanical devices capable of increasing the size of the radar echo. Their effect is similar to that of blip enhancers, but they cannot be turned off.

Another device that could be used effectively is the decoy. Decoys are equipped with blip enhancers and/or noise jammers and used to simulate ships or attract missiles. Apparently, no country at this time uses decoys. It is probably very difficult to make a very small decoy appear as a large ship. However, if this problem can be solved, decoys could be a great aid in the defense against missiles.

ECM has proven to be a very vital element in naval warfare. In 1967, four SS-N-2's were fired at the Israeli destroyer, **Eilat**. All hit. In 1971, the Indian Navy fired thirteen SS-N-2's at Pakistani ships and twelve hit. None of these targets had ECM. In 1973, the Israelis equipped their missile boats with chaff launchers and cheap Italian deception jammers. During the Yom Kippur War, over fifty SS-N-2's were fired at these Israeli vessels, and no hits were scored.

The fourth element of electronic warfare is electronic counter-countermeasures (ECCM). These are devices built into radars that are designed to minimize the effect of opposing ECM. One ECCM device is built into the method of operation of the radars. Initially, all radars were simple pulsed systems, and ECM was originally designed to combat such systems. The conical scan radars, which include most of the currently available fire control radars, are examples of simple, pulsed radars. One of the earlier attempts to build a radar that was resistant to ECM was the development of the continuous wave radar. Continuous wave radars are not pulsed; they merely continuously transmit a radar signal in the desired direction. Since the signal is continuous, such radars are unable to determine range. Instead, continuous wave radars measure the change in the target's Doppler, and in this way, can measure the speed of the target and determine if it is moving closer or farther away from the radar. Doppler refers to the change in pitch of a sound coming from a moving source. As the source approaches the receiver, the pitch of the sound rises while as the source recedes from the receiver, the pitch of the sound descends. The continuous wave radars are able to measure the change in pitch of the target echo and thus determine its speed. Since these radars can easily determine target speed, they can filter out noise jamming (which has no Doppler), and, to some extent, chaff (which moves very slowly). Originally, normal deception jamming techniques did not work against continuous wave radars, but this has been corrected and they are now subject to range or velocity gate pull off. Continuous wave radars are very useful due to their resistance to noise jamming and chaff, but since they are unable to determine range, they can only be used for missile guidance, where range information is unnecessary.

An attempt to combine the advantages of continuous wave with the ability to determine range resulted in the development of the pulse doppler radar. A pulse doppler radar operates like a pulsed radar and can obtain range information in the same manner. In addition, pulse doppler radars measure doppler similar to continuous wave radars and can to some extent eliminate chaff and to a lesser degree, noise, Pulse doppler fire control radars can control most weapons, and some recent search radars are pulse doppler also.

The most recent development in fire control radars has been the development of the monopulse radars. Monopulse radars have several receivers, usually three or four, which are separated from each other. When the echo is received by the receivers, the radar can use the differences in the signal received by each receiver to determine the target's range and bearing. The operation of a monopulse radar is analogous to some degree, to the use of a steroscopic range finder which compares separate images to arrive at the actual range. The main value of monopulse radars is that normal range or velocity gate pull off is ineffective against them, and when an MTI filter (see below) is added to the radar, it becomes resistant to most ECM normally used against fire control radars. Range or velocity gate pull off can be used against monopulse radars in only certain situations. If two jamming units are within the main beam of the radar, their echos will blur into one large echo and the radar will lock onto the center of that echo which should be somewhere between the two jamming units. Similarly, an aircraft at low altitude can bounce its jamming signal off the surface of the earth in addition to sending it directly at the radar;

again, the radar will be unable to determine that it is receiving two signals and will lock onto the point lying directly between the two signals. Of course, these techniques require that both jamming signals originate in the main beam of the radar; if both are not in the main beam, the radar will pick up the two separate signals and can easily determine the true target. A third technique for jamming monopulse radars requires the use of **Cross Eye**. Cross Eye is currently installed on US B-52's; it is not known if it has yet been installed on ships. It is a jammer having two receivers and transmitters separated as far as possible from each other. The signals received at one point are transmitted back to the radar from the opposite point, with the phase shifted by 180°. This generates large angle errors in the radar. Although Cross Eye is helpful, it can be defeated by the monopulse radar if the radar operator is well trained. Monopulse radars are extremely large and expensive, but they are so effective that most countries are developing new monopulse radars or are converting older equipment to monopulse processing.

Frequency agility is a device built into some radars to enable them to counter noise jamming to some degree. As indicated in the ECM section above, noise jamming is effective against a radar only when the noise is transmitted at the radar's operating frequency. Frequency agility is a device that changes the radar's operating frequency at random from pulse to pulse. Spot jamming is completely ineffective against frequency agile radars, and in many cases, only barrage jamming can counter frequency agility.

Another ECCM device is Moving Target Indicator (MTI). MTI devices measure and gradually filter out signals which are not moving. Radars equipped with MTI are about as effective as pulse doppler radars in filtering out chaff and noise.

Finally, jittered pulse repetition frequency (PRF) is included in many radars. The time between pulses of radars having jittered PRF is randomly changed from pulse to pulse, and all signals which could not possibly be true echos are filtered out. This technique greatly reduces the effectiveness of deception jamming because many jamming signals transmitted at the wrong moment, are filtered out by the radar.

The developments in ECM and ECCM occur continuously with new ECCM making old ECM equipment obsolete, which is then replaced by new ECM equipment resistant to ECCM. Electronic warfare is the most dynamic, multi-faceted, and ever changing element in modern warfare.

12. COMMUNICATIONS:
The radio is still the most common means of communications. Ships are usually equipped with a short range communication suite and a long range communication suite. Short range communication is limited by the radar horizon, i.e., the UHF radio waves of the short range sets travel only in a straight line and do not follow the curvature of the earth. The main advantage of short range UHF communication is that the radio waves can be concentrated in a small beam that is directed at the receiver. Since all of the waves travel in one direction only, the transmission cannot be detected or jammed except by units lying directly in the path of the transmission. Long range VHF communication sets are used for communications extending beyond the radar horizon. The range of such sets is probably several hundred miles. Unlike short range communication, long range communication signals cannot be concentrated into narrow beam; they must be more or less omni-directional to be effective. Hence, long range communication is easily detectable. All ships carry radio detectors similar to World War II "Huff-Duff" with a range of several hundred miles. In addition to revealing the message being sent, radio detectors can also determine the relative bearing of the transmitter.

New opportunities for secure long range communications have been realized by the development of the communication satellite. Since the satellites operate at a very high altitude, they are frequently within the radar horizon of both receiver and transmitter even though the receiver is at a great distance from the transmitter. Therefore, directional radio waves can be transmitted to the satellite which in turn will relay the message to the receiver via a directional radio beam. In this way, the security of short range communications can be brought to long range transmissions.

A recent important advance in communication has been the development of the data link. Data link essentially is an automatic short range UHF communication system connecting computers with one another. When information becomes available to a computer, it is immediately, automatically, transmitted to all other computers in range so that all computers receive the information. As with other short range UHF communication, data link is directional and very difficult to detect and jam. Tactically, data link is important because it allows units to engage targets beyond the range of their own sensors thereby increasing effective weapon range and reducing response times. It is possible for a single ship or aircraft to act as a "scout" for a larger force. If the scout detects the enemy, the entire force can respond to it while remaining outside the range of the enemy's sensors. Although data link is extremely valuable, it is rather new and will fail to function properly on occasion.

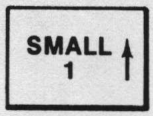
A new communications device being installed on some US ships is laser signalling. Laser communications allow ships to communicate with other ships in a direct line of sight, in a similar manner to short range communications, but with the advantage that jamming is currently impossible. Ships would be able to communicate with other ships with lasers even if their conventional radios have been knocked out. As with short range radio communications, laser communications is directional and line of sight; ships cannot communicate via laser with units beyond the visual horizon.

PART 1: SURFACE ACTIONS

III. NECESSARY EQUIPMENT:

This game is designed to be played with miniature ship models on a fairly large playing area. Although models of any size up to 1:1200 may be used, the best size is 1:3000 scale models. In addition to the ship models, the following equipment is necessary.

1. A playing area. This must be a flat area at least 6' long on each side.
2. A number of rulers for moving ship models.
3. A long ruler or tape measure for measuring ranges.
4. A number of acetate sheets or plastic page protectors for use on the Tactical Data Displays described later.
5. A number of grease pencils or felt tip pens to write on the page protectors (be sure that the ink from the pens will not bead up and disappear when used on the plastic page protectors).
6. A deck (or decks) of playing cards from which all picture cards are removed, leaving only ace (one) through ten.
7. Several twenty-sided decimal dice.
8. Several standard six-sided dice.
9. A number of cardboard counters (of ½" or ¼" square). The following counters are required.
   a. A number of counters bearing the designation "small"; each will be numbered (e.g. Small-1; Small-2; Small-3, etc.) and will have an arrow pointing toward one side to indicate the front of the unit.



   b. A number of counters similar to those in (a) but bearing the designation "Medium".
   c. A number of counters similar to those in (a) but bearing the designation "Large".
   d. A number of counters similar to those described in (a), (b), and (c), but also bearing the designation "Missile" in addition to "Small", "Medium", or "Large".

   e. A number of counters bearing only the following designations:
      1) Chaff
      2) Flare/Illumination
      3) Torpedo
      4) Blip
      5) Noise
      6) Radar
      7) Real

   f. A number of counters bearing no designation at all (blank counters).

The number of each type of counter that will be necessary is really dependent on the size of the game. However, the following guidelines may be used: the counters indicated in (a), (b), and (c) will represent the ships and also will be used as "dummies". There must be one counter indicating the proper size for each ship used, and an equal number to use as dummies. The counters in (d) will represent missiles. Missile counters must be made up in sets, each set consisting of four

counters bearing the exact same designation. For example, there must be four "Medium Missile, 1" counters, four "Medium Missile, 2" counters, etc. About one of these sets per ship will be sufficient. These counters indicate the size of the missile, so determine the size designations of the needed counters by checking the size of the missiles carried by each ship on the SSM Data table. Of the counters in (e), about ten of each per side should be all that is required. In fact, probably much fewer of the Flare and Chaff counters will be required. Of the counters in (f) there should be at least two times as many counters as there are actual ships. Although this sounds like a great deal of counters, most of them will not be used in any single game. It is recommended that the players be provided with a sheet of "blank" counters which can be filled in as required during the game.

It is recommended that the counters in **a** through **c** should be different colors for each team. Most of the counters in **e** will be used by both sides, so they should be a third color. The main exception is the "Missile" counters; these should be of the same color as the counters representing the team's ships, etc.

IV. GAME SCALE:

Each ship model represents one actual vessel. One inch on the playing surface equals 1/3 of an nautical mile (2000 yds); one turn equals 2 minutes of real time. If using a very large playing area, the game scale may be increased accordingly. Thus, each inch may equal one-sixth or one-twelfth of a nautical mile if space permits.

V. PREPARING FOR PLAY:

1. The game is normally played by two players or teams. The players decide upon the situation and the number and type of ships, etc., that each side will use. They must then designate the starting areas for both sides. The starting areas are the areas of the playing surface where each player is allowed to initially set up his forces. In most cases, the starting areas should begin at the edge of the playing area and extend to a depth of approximately 6" - 12" toward the center. The length of each starting area should normally be several feet. The starting areas need not be directly opposite each other. Thus, if one player's starting area is at the North edge of the playing area, his opponent's starting area need not be at the South edge. There should normally be at least 60" between the starting areas unless the players desire that units be within radar or visual sighting range at the start of the game.

2. Each team will then place the counters that will represent their ships at the start of the game face up anywhere within their starting areas. The size indicated on the counter must correspond with the size of the ship it represents:

- **a.** Ships of under 1000 tons - use "Small counters.
- **b.** Ships of between 1000 and 10,000 tons - use "Medium" counters.
- **c.** Ships of over 10,000 tons - use "Large" counters.

The counters must be placed so that the arrow is pointing in the direction the ship is heading.

3. At the same time, the players may place a number of counters in the starting area which will not represent any ship, but will be used merely to confuse the opposing players. These are called "Dummy" counters. The counters used will be the same type as those used to represent actual ships. The size designations used may be any size desired by the player using them. A team may use no more than two "Dummies" for every actual ship in its force.

4. Each player will be provided with a Tactical Data Display for each of his ships. The Tactical Data Display (TDD) will indicate the size of the ship, the equipment carried, and the amount of damage sustained by it. A sample TDD is included in the back of the rule book to show you the format. The TDD's must be kept within plastic page protectors because it will need to be frequently erased and updated as the game goes on. Grease pencils or felt tip pens should be used on the TDD's since they are easily erased. Opposing players should never be allowed to see the other player's TDD's.

5. On each ship's Tactical Data Display, the owning player will record the size and numerical designation of the counter representing the ship before the game begins.

6. If radar is being used in the game, two additional counters will be placed face down underneath all of the ship and "dummy" counters already placed on the playing area. The top counter placed under the counters representing real units must indicate "blip", while the bottom counter must indicate "real". For all "Dummy" counters, both counters placed beneath it must be blank. Exception: as indicated in the ECM section of the Electronic Warfare rules, the top counter placed beneath a "Dummy" may indicate "blip" if a deception jammer is being used (see the ECM rules section for further information). The two counters placed beneath the ship and "dummy" counters are called "Radar Search Counters".

As indicated in the movement rules, the counters indicated in rules 2 and 3 will be moved in lieu of the actual ship models until the unit is visually sighted. In addition, the counters placed beneath the counters will be moved along with them.

7. On a piece of paper, the players will secretly indicate the manner in which their units will move until an enemy contact is made. The players must write down the speed at which their units will move, the direction, and the point at which any turns will be made. If a unit is going to turn, the player must indicate the direction of the turns and the number of degrees. There is no set style in which this information is to be written, but it should be clear.

Example: A player may indicate that his ships will move one behind the other forward for 15", then the lead ship will turn 45° to port. All ships will follow the leader's track.

Once a contact is made with any enemy unit by any method (visual sighting, active or passive sensor), the units may move as desired thereafter as long as contact is held with at least one opposing unit; the written directions will no longer be binding. Beginning with the second turn following the turn in which all enemy contacts are lost, all units must continue moving in a straight line until another enemy contact is made; no further turning will be allowed until a new contact is obtained.

8. On the same piece of paper indicated in 7, the players will indicate the phase in which each ship's radar, sonar and ECM devices will be turned on and off. Until at least one enemy unit is contacted by any method, the ship's electronic equipment can only be used as indicated on the paper. Once a contact is made with an enemy unit (including torpedoes, missiles, etc., as well as ships and aircraft) by any method (visual sighting, active or passive sensors), electronic devices may be used as desired. The unit making the actual contact and all units with a data link connection to it may begin using the devices as desired beginning with the phase the contact occurs; all other units may use the devices as desired beginning with the following phase provided they are in communication with the unit making contact. Units which are not in communication with the contacting unit may not use electronics as desired until they become aware of the contact. See Section XIII for further information on data link and other forms of communication.

If the units make a contact which is subsequently lost, the units may still use electronics as desired during the phase following the phase in which the contact is lost. Thereafter, however, no change can be made in the use of electronics until another contact is made. In other words, any device used by the unit during the phase after contact is lost must continue to be used and no new devices may be turned on until another contact is made.

VI. SEQUENCE OF PLAY - SURFACE ACTIONS:

The following sequence of play will be followed each turn:

1. The player moving first will move any or all of his units as desired.
2. Both players will resolve all attempts at visual sighting. This begins the first combat phase of the turn.
3. Both players will resolve the use of all electronic searching equipment.
4. Both players will resolve all gunfire.
5. Both players will resolve the use of surface to surface missiles.
6. Both players will resolve the use of torpedoes.
7. Both players will resolve all attempts at damage control. This ends the initial combat phase of the turn.
8. Both players will resolve radio and signal communications (communication phase).
9. The player moving second will move any or all of his units as desired.
10. Both players will resolve all attempts at visual sighting. This begins the second combat phase of the turn.
11. Both players will resolve the use of all electronic searching equipment.
12. Both players will resolve all gunfire.
13. Both players will resolve the use of SSM's.
14. Both players will resolve the use of torpedoes.
15. Both players will resolve all attempts at damage control. This ends the second combat phase.
16. Both players will resolve radio and signal communications (communications phase). This ends the complete turn.

NOTE: Movement is alternate although combat is simultaneous. The players must determine before the game begins which side will move during the initial movement phase of the turn, and which will move during the second. They will continue moving in this way throughout the entire game.

VII. MEASUREMENT:

Whenever the measurement of distances is required, always measure from the bridge (or cockpit, if measuring from an aircraft). For example, if 10" separates the bridges of two ships, those ships are said to be 10" away from each other, regardless if some other points on the ships are closer or more distant than 10".

VIII. MOVEMENT:

1. BASIC MOVEMENT PROCEDURES:
Until a unit is located by visual sighting, the actual model will not appear on the playing surface. Instead, the counter bearing the unit's designation will be moved on the playing surface in its place. When the unit is finally visually sighted, the counter is removed from the playing surface and the actual ship model is placed at its location.

2. "DUMMY COUNTERS":
As noted in the Setting Up section of the rules, each team will be provided with a number of "Dummy" counters which can be set up in the starting areas. These counters may be moved as desired by the owning player in order to mislead his opponent as to the actual location of his ships. These counters may be moved as desired and they may be removed from play and then brought back into play at any time the owning player desires to do so.

3. BASIC MOVEMENT RULES:
The following basic movement rules will apply to all movement:

a. The maximum distance a ship may move during a turn is called its current speed. A ship must move its full current speed during each turn; it may not move either faster or slower than this speed. As explained below, the current speed of a ship may be changed each turn by acceleration or deceleration.

b. Ships must move **directly** forward unless the engines are reversed, in which case they must move directly backward. To change the direction in which a ship's bow is pointing, players must follow the turning procedures given below (rule 5). If a ship is represented by a counter, the arrow on the counter indicates the direction in which the bow is pointing.

c. Ships may not move through each other or within 1" of each other without the possibility of collision. If such a move is attempted, immediately consult the collision rules below. If no collision occurs, the intended movement may be completed; if a collision occurs, both ships are stopped at the point of impact.

d. A ship's movement speed is expressed in terms of knots. For game purposes, each ship is assigned a speed that is a multiple of 2.5; round off the actual speed of the ships to the **nearest** multiple of 2.5 kts.

For example: A ship with an actual speed of 36 kts will, for game purposes, be assumed to have a speed of 35 kts, while a ship whose actual speed is 32 kts will be assumed to have a speed of 32.5 kts.

e. Except where specifically indicated, a player may move his ships **only** during his own movement phase; a player may not move his ships during his opponent's movement phase or any combat phase.

4. MOVEMENT OF THE PLAYING SURFACE:
During each turn, all units moving on the playing surface represented by either a counter or ship model, will be moved ¼" for every 2.5 kts of current speed. Thus, a ship having a current speed of 20 kts will be moved 2" per turn, while a ship having a speed of 22.5 kts will be moved 2¼".

5. TURNING:
a. Turning may be accomplished at any time during a ship's move. Turning requires three steps:
1. Changing facing direction.
2. Paying the appropriate movement cost.
3. Moving directly forward for a certain distance (as indicated below) before attempting another turn.

b. The first step in turning is changing the ship's facing direction. Pivot the ship on its **bow** until it faces the new direction. The maximum number of degrees that a ship may pivot at one time is as follows:

1. Ships displacing 10,000 tons or more may pivot no more than 45° at one time.

2. Ships displacing less than 1000 tons may pivot up to 90° at one time.

3. Ships having a displacement of between 1000 and 10,000 tons may pivot no more than 45° the first time they pivot during a turn, up to 90° the second time they pivot, 45° the third time, 90° again the fourth time and so on in the same manner.

4. Submerged subs may pivot 90° at one time regardless of displacement.

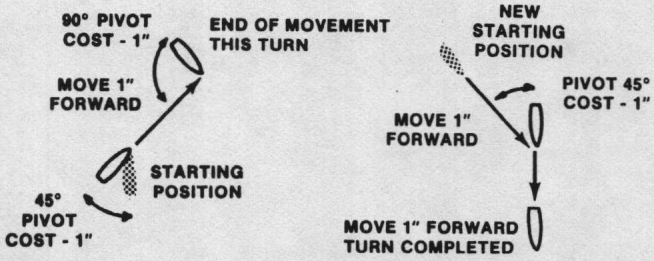
5. Ships which are listed as highly maneuverable on the Ship Characteristics Table (such as the Spruance class DD) may increase the angle of pivot by 45°. Thus, such ships may pivot 90° the first time they pivot during the turn, 135° the second time, and so on.

6. During any point during a ship's move, the moving player may designate any or all of his ships as making an emergency turn. Ships making emergency turns may increase the pivoting angle by 45°, but they will incur a greater speed loss (see (b) below) than if making a normal turn, and the accuracy of their weapon systems will be reduced during the subsequent combat phase.

c. Whenever a ship pivots, its movement speed is reduced by 1" for that turn. The number of degrees pivoted is immaterial, the cost is always 1".

Exceptions:
1. If a ship's speed is less than 10 kts, the movement cost for pivoting will be equal to its speed.
2. If a ship is making an emergency turn, its movement speed will be reduced by 2" rather than one.
3. Submerged subs will suffer no movement penalty if they turn 90° or less during the turn. If they turn over 90°, the subs will lose 1" of speed following the pivot in which 90° is exceeded. Submerged subs making emergency turns will lose 1" for every pivot, rather than the normal 2".

d. After a ship has pivoted and paid the movement penalty, it must then move directly forward for 1" before being allowed to pivot again. Once it has moved this distance, it has completed its turning maneuver and may either continue to move directly forward or begin another pivot. This required movement need not be completed in the same turn that the pivot was accomplished; i.e., a ship may pivot during one turn and move 1" forward in the subsequent turn if it does not have sufficient speed remaining after pivoting. The example shows a 3000 ton destroyer accomplishing a 180° turn.



NOTE: The movement cost for pivoting does not actually reduce the number of kts at which the ship is travelling. Thus, a ship with a speed of 30 kts which pivots and so loses 1" of speed for that turn will still be considered to have a speed of 30 kts for all purposes. If the ship does not pivot during its next turn, it will continue to move at a speed of 30 kts assuming it neither accelerates nor decelerates.

6. MOVING EVASIVELY:
During his movement phase, a player may indicate that one or more of his ships will move evasively during the phase. He must designate which ships will move in this manner before he actually moves them. Ships which move evasively will be unable to turn and will lose 1" of movement speed during the phase. This loss is treated in the same manner as the speed loss for turning, i.e., it is not considered to effect the number of kts at which the ship is travelling.

For example: A ship with a speed of 30 kts which loses 1" for moving evasively will still be considered to have a speed of 30 kts.

By moving evasively, a ship will reduce its chance of being hit by enemy fire, but at the same time, its own accuracy will be reduced.

7. ACCELERATION:
a. Introduction: A ship's acceleration rate is dependent upon the type of engines being used, the ship's maximum speed (i.e., its maximum speed as indicated on the Ship Characteristics Table, unreduced for damage, sea state, etc.) and the ship's current speed at the beginning of the phase. The acceleration rates given below are the maximum rates by which a ship can increase its speed. Ships may accelerate at less than the maximum rate. No ship may accelerate beyond its maximum speed as indicated on the Ship Characteristics Table.

b. Acceleration rates for conventional and nuclear steam engines:

1. If the ship's current speed at the beginning of the phase is less than 50% of its maximum rated speed, its speed may be increased by up to as much as is listed below:

Maxium Speed	Increase
to 10 Kts	2.5 Kts
11 - 20 Kts	5 Kts
21 - 30 Kts	10 Kts
31 - 40 Kts	15 Kts
41 - 50 Kts	20 Kts

2. If the ship's current speed at the beginning of the phase is between 50% and 75% of its maximum speed, its speed may be increased by 2.5 Kts if its maximum speed is 30 Kts or less, or by up to 5 Kts if its maximum speed exceeds 30 Kts.

3. If the ship's current speed at the beginning of the phase is equal to or greater than 75% of its speed, its speed may be increase by no more 2.5 Kts, regardless of its maximum speed.

c. Acceleration rates for diesel and gas turbine engines: Ships equipped with these engines can increase their speed by up to 50% of their maximum speed each turn. EXAMPLE: A ship with a maximum speed of 30 Kts can increase its by up to 15 Kts each turn untill its speed equals 30 Kts.

d. Combined Engines:

1. Ships which use one type of engine for cruising and another for high speed (e.g. CODOG) will accelerate at the rate of the engine being used.

2. Ships which cruise on one type of engine and use both those engines and another type of engine when high speed is desired (e.g. COSAG) will accelerate as follows: If the ship's speed at the beginning of the phase is less than its cruising speed, the ship will accelerate at the of its cruise engines; If the ship's speed is equal to or greater than its cruise speed, it will accelerate at the rate of its high speed engines.

e. Acceleration in reverse:
When a ship accelerates in reverse, use its maximum foward speed to determine the rate of acceleration, rather than its maximum reverse speed. EXAMPLE: If a ship has a maximum forward speed of 30 Kts and a maximum reverse speed of 10 Kts, its acceleration rate when moving in reverse will be based on a maximum speed of 30 Kts.

a. Deceleration rates;

A ship's deceleration rate is based upon its displacement and its maximum rated speed. The number of knots by which a ship's speed may be reduced each turn is as follows:

Ship's Displacement	Deceleration Rate
Under 1000 tons	25 Kts/turn
1000 - 1999 tons	20 Kts/turn
2000 - 9999 tons	15 Kts/turn
10,000 - 29,999 tons	12.5 Kts/turn
30,000 tons and over	10 Kts/turn

b. Acceleration rates for conventional and nuclear steam engines:

1. If the ship's current speed at the beginning of the phase is less than 50% of its maximum rated speed, its speed may be increased by up to as much as is listed below:

Maximum Speed	Increase
to 10 kts	2.5 kts
11 - 20 kts	5 kts
21 - 30 kts	10 kts
31 - 40 kts	15 kts
41 - 50 kts	20 kts

2. If the ship's current speed at the beginning of the phase is between 50% and 75% of its maximum speed, its speed may be increased by 2.5 kts if its maximum speed is 30 kts or less, or by up to 5 kts if its maximum speed exceeds 30 kts.

3. If the ship's current speed at the beginning of the phase is equal to or greater than 75% of its speed, its speed may be increased by no more than 2.5 kts, regardless of its maximum speed.

c. Acceleration rates for diesel and gas turbine engines: Ships equipped with these engines can increase their speed by up to 50% of their maximum speed each turn. **Example:** A ship with a maximum speed of 30 kts can increase its speed by up to 15 kts each turn until its speed equals 30 kts.

d. Combined engines:

1. Ships which use one type of engine for cruising and another for high speed (e.g. CODOG) will accelerate at the rate of the type of engines being used.

2. Ships which cruise on one type of engine and use both those engines and another type of engine when high speed is desired (e.g. COSAG) will accelerate as follows: if the ship's speed at the beginning of the phase is less than its cruising speed, the ship will accelerate at the rate of its cruise engines; if the ships speed is equal to or greater than its cruise speed, it will accelerate at the rate of its high speed engines.

e. Accelerating in reverse: When a ship accelerates in reverse, use its maximum **forward** speed to determine the rate of acceleration, rather than its maximum reverse speed. **Example:** If a ship has a maximum forward speed of 30 kts and a maximum reverse speed of 10 kts, its acceleration rate when moving in reverse will be based on a maximum speed of 30 kts.

8. DECELERATION:

a. A ship's deceleration rate is based upon its displacement and its maximum rated speed. The number of knots by which a ship's speed may be reduced each turn is as follows:

Ship's Displacement	Deceleration Rate
Under 1000 tons	25 kts/turn
1000 - 1999 tons	20 kts/turn
2000 - 9999 tons	15 kts/turn
10,000 - 29,999 tons	12.5 kts/turn
30,000 tons and over	10 kts/turn

b. Double the deceleration rate if the ship's maximum rated speed (i.e., its speed as listed on the Ship Data Chart) was between 45 and 85 kts; triple the deceleration rate if the ship's maximum rated speed exceeds 85 kts.

c. Reduce the deceleration rate by 50% (rounding upward to the nearest 2.5 kts) if the ship's maximum rated speed is between 11 and 25 kts inclusive, reduce the deceleration rate by 75% if the ship's maximum rated speed is 10 kts or less.

d. A ship may not both accelerate and decelerate during the same turn.

9. REVERSING ENGINES:

In order to reverse engines, a ship must decelerate to a speed of 10 kts or less in accordance with Rule 8 above. Beginning on the following turn, the ship may start to accelerate in the opposite direction in accordance with Rule 7. For acceleration purposes only, such ships are considered to have a speed of 0 at the beginning of the phase of initial acceleration.

10. BACKWARD MOVEMENT:

a. A ship with engines reversed will move directly backward rather than forward. The maximum reverse speed of a ship is based upon its maximum forward speed:

Forward Speed	Reverse Speed
2.5 - 7.5 kts	2.5 kts
10.0 - 17.5 kts	5.0 kts
20.0 - 27.5 kts	7.5 kts
30.0 - 37.5 kts	10.0 kts
40.0 - 47.5 kts	12.5 kts
50.0 - 57.5 kts	15.0 kts

If a ship's speed exceeds 57.5 kts, continue pattern above to determine its reverse speed.

b. The reverse speed of a ship is based upon its maximum forward speed unreduced for battle damage. If a ship's maximum forward speed is reduced due to battle damage or other causes, its maximum reverse speed will remain the same. However, if damage reduces a ship's maximum forward speed to less than its rated reverse speed, the ship's reverse speed will equal its current forward speed; a ship's reverse speed can never exceed its maximum forward speed.

11. COLLISIONS:

a. Collisions can occur when:

1. Ships are within 1" of each other at the end of a movement phase.

2. A ship moves across the path of another ship which has already moved during that movement phase passing astern of it and within 1" of its position.

3. A ship moves across the bow of another ship that has not yet moved during that movement phase and passes within 1" of its position.

In all cases above, the distance is measured from bridge to bridge.

b. At the end of a movement phase in which a collision is possible, roll one six-sided die to determine if a collision actually occurs. If the number rolled, after adjustment, is 4 or higher, a collision occurs. Adjust the number rolled as follows:

1. Subtract 1 if either of the involved ships has a displacement of less than 1000 tons or is listed as highly maneuverable.

2. Add 1 if both of the involved ships have a displacement of 10,000 tons or more.

3. Add 1 for each ship that does not have a functioning CIC and bridge (see Damage and Damage Control).

c. If a collision occurs, the involved ship which moved last is assumed to be the ship which caused the collision, while the other ship is considered to be the one which was collided with. Players then determine the point of collision, and immediately move the ships as indicated below:

1. If the ships ended the movement phase within 1" of each other, the collision occured at the point occupied by the ship collided with at the end of its move. Move the ship causing the collision in such a way that its bow is as close as possible to the bridge of the ship collided with (without having the models physically lying on top of each other), but do not change the facing direction of either ship.

2. If the collision occured when a ship passed astern or across the bow of another ship, the point of collision is at the point where the paths of the ships crossed. Move the ship collided with so that its bridge is at the point of collision. Next, move the ship causing the collision so that its bow is as close as possible to the bridge of the ship collided with (without actually resting on top of the model). Change the facing direction of both ships to what it was at the point of collision.

d. When two ships collide, their current speed immediately becomes 0, and players must follow the normal acceleration rules beginning on the following turn to regain speed. The ship causing the collision must move in reverse during that turn or neither ship may move.

e. Now, determine the damage sustained by each ship. For NATO and Israeli warships, roll one decimal die and consult proper table on the Collision Damage Chart. There are several different damage tables based on the size difference between the involved ships with separate sections for the ship which caused the collision and for the ship collided with; be sure to use the proper table. To determine which table to use, ascertain which of the situations below apply:

1. Situation 1 - The ship causing the collision has a displacement that is at least 50% greater than the displacement of the ship collided with.

2. Situation 2 - The ship collided with has a displacement that is at least 50% greater than the displacement of the ship causing the collision.

3. Situation 3 - Neither situation 1 nor situation 2 apply. Consult the proper table and sustain the damage indicated.

For British and Canadian warships, do the same, but subtract 1 from the die roll when consulting the damage chart. If the result is 0, the ship will sustain the damage listed for number one.

For Soviet and Warsaw Pact warships and warships of all other countries other than NATO and Israel,, roll the die two times and sustain all of the damage indicated by both rolls.

For all merchants, roll the die three times and sustain all of the indicated damage.

12. COLLISION DAMAGE:
a. Flooding: When flooding occurs, the basic number of flotation points to be sustained by the ship will be as follows:

1. Minor Flooding - ⅛ of the ship's Maximum Flotation Allowance.

2. Moderate Flooding - ¼ of the ship's Maximum Flotation Allowance.

3. Heavy Flooding - ½ of the ship's Maximum Flotation Allowance.

4. Very Heavy Flooding - ¾ of the ship's Maximum Flotation Allowance.

b. Engine Damage: If a ship sustains engine damage due to collision its maximum speed will be reduced as follows:

1. Minor Damage	-	5 kts
2. Moderate Damage	-	10 kts
3. Major Damage	-	½ of the maximum speed
4. Very Severe	-	Ship is dead in water

c. Electronics Damage: Whenever a ship sustains electronics damage, roll one decimal die and consult the table below to determine which piece of electronic equipment is KO'ed. If the ship sustained severe electronics damage, roll the die two times; if it sustained very severe electronics damage, roll the die three times. If the ship does not have the equipment listed on the table or if the equipment was already knocked out, roll again until the table calls for damage to equipment which is on the ship and in working order.

1 - Air Search Radar	6 - Sec SAM FC Radar
2 - Surface Search Radar	7 - SSM - FC Radar
3 - Main Gun FC Radar	8 - Radar Detector
4 - Main SAM FC Radar	9 - Radar Jammer
5 - Sec Gun FC Radar	10 - Sonar

For the effects of all damage, see the Damage and Damage Control sections of the rules.

IX. VISUAL SIGHTING:

1. INTRODUCTION:
As mentioned in the Movement section of the rules, ship models will not be placed on the playing surface until they are visually sighted by at least one opposing unit. Visual sighting can occur only during the Visibility Phases of each turn.

2. VISIBILITY PROCEDURES:
a. If units (i.e., ships, aircraft, missiles) represented by either counters or actual models, are being moved on the playing surface and there is some doubt as to whether or not they are visually sighted, the players will take a ruler and measure the distance between all such units and each opposing unit during the visibility segment of the turn. If the distance between those units is equal to or less than the maximum Visual Sighting Distance (given below), the unit is visually sighted. If the unit is represented by a counter, immediately replace the counter with the actual model. If the distance exceeds the maximum Visual Sighting Distance, the unit is not visually sighted. If any such unit is represented by an actual model, immediately replace the model with a counter.

b. Determine which units visually sighted opposing units. Write the name or designation of each sighted unit on the TDD's of all sighting units and on the TDD's of all units connected to a sighting unit by data link. This information is recorded in the Visual Radar box. If a unit which was previously sighted is no longer in sighting range of a unit, erase its designation from the unit's TDD.

3. VISIBILITY RESTRICTIONS:
a. No unit can visually sight another unit if it is beyond the Visual Sighting Distance.

b. All units can visually sight in all directions, i.e., within a 360° radius.

c. The presence of other units will not affect the visual sighting ability of a unit.

d. The presence of land will block the visual sighting ability of all ships, although in some scenarios, the players may decide that the height of the land is so low that it will only block the line of sight of the smaller ships.

4. BASIC VISUAL SIGHTING DISTANCES:
a. The following visual sighting distances apply only during daylight and when there is neither fog nor bad weather.

Sighting Ship	Ship Being Sighted	Max. Visibility Range
Over 10,000 tons	Over 10,000 tons	18 miles (54")
	1000 - 10,000 tons	16 miles (48")
	Under 1000 tons	12 miles (36")
1000 - 10,000 tons	Over 10,000 tons	16 miles (48")
	1000 - 10,000 tons	14 miles (42")
	Under 1000 tons	10 miles (30")
Under 1000 tons	Over 10,000 tons	14 miles (42")
	1000 - 10,000 tons	12 miles (36")
	Under 1000 tons	8 miles (24")

b. Fog: Fog can greatly reduce the maximum Visual Sighting distances, sometimes to as low as one-third of a mile (1"). Decide before the game the maximum Visual Sighting Distance through fog. If the distance between opposing ships exceeds this distance, they will be unable to visually sight each other.

c. Night: On bright, moonlit nights reduce all Visual Sighting Ranges by ½; on normal nights, reduce Visual Sighting Ranges by ¾. On especially dark nights (no moon or cloud cover) reduce Visual Sighting Ranges by ⅞. Round off all results upward to the nearest 1/3 mile.

d. Night Time Visual Aids:

1. Searchlights: Each player may decide to turn on searchlights during any Visibility Phase. If he does so, the lights must remain on until the following Visibility Phase. Ships with searchlights on can visually sight all units which are within five miles (15") of their positions, but they, themselves, can be visually sighted by all opposing units out to the maximum' daylight range.

2. Starshells: These may be fired from any gun of 3" (76mm) caliber or greater during the Visibility Phase of the turn at units located by **active** sensors (or visual sighting). The maximum range to which starshells can be fired is equal to 75% of the gun's maximum range. In order to fire a starshell, the player must indicate which gun will do so, and designate the ship being fired upon. He will then place an illumination marker beyond the target, but within 1" of its bridge. All ships within 1" of the marker will be immediately illuminated. The illumination marker will remain in place for one full turn. During that time, if any ship passes within 1" of the marker it will be illuminated. All ships which are illuminated can be visually sighted just as if it were daylight.

Ships that were illuminated during a Visual Sighting Phase will cease to be illuminated at the end of the next Movement Phase if they are not within 1" of the marker at that time; ships which passed within 1" of an illumination marker which did not illuminate them during the prior Visual Sighting Phase will cease to be illuminated at the end of the Movement Phase following the Movement Phase in which they passed within 1" of the illumination marker if they are not within 1" of the marker at that time. Remove the illumination markers at the end of the Visual Sighting Phase following the Visual Sighting Phase during which they were fired.

X. GUNFIRE AGAINST SHIPS:

1. GUNFIRE REQUIREMENTS:
a. During the gunfire segment of each combat phase, all ships may simultaneously fire their guns if the firing requirements are met. The firing requirements are as follows:

1. The target must be in range. Ranges are listed on the Gunnery Data Table. Always measure range from the bridge of the firing ship to the bridge of the target.

2. The guns must be able to bear on the target. This is determined as follows:

a. Bow weapons may fire directly forward or up to an angle of 135° from that direction.

b. Stern weapons may fire directly astern or up to an angle of 135° from that direction.

c. Weapons mounted on the side may fire directly perpendicular to the ship in the direction they are mounted or up to an angle of 90° from that direction.

3. The gun must not already have been fired during the combat phase. Each gun may be fired only once during each combat phase.

4. If either the target or the firing ship has a displacement of under 1000 tons, no ship of over 1000 tons must lie directly between the firer and the target. Similarly, if either the target or the firing ship has a displacement of between 1000 and 10,000 tons, no ship of over 10,000 tons must lie directly between the firer and the target. A ship is considered to be lying between two other ships if its bridge is directly on a line extending from the bridge of the firing ship to the bridge of the target.

5. At the time of firing, the target must be either visible to or located by the radar of the firing ship, or it must be visible to or located by the active sensors of a friendly unit having a data link connection with the firing ship. The concept of being located by active sensors will be fully explained in the Electronic Warfare Section of the Rules, while the concept of Data Link is explained in the Communications Section.

Gunfire is not permitted against targets which are located only by passive sensors.

6. All surface targets must have been initially located by visual sighting or an active sensor of either the firer or a unit in communication with the firer during a phase prior to the phase of firing; that is, a surface target may not be fired upon during the combat phase it is initially located. Missile and aircraft targets however, may be fired upon during the phase they are initially located.

7. Each gun mount may be fired against only one surface target during each phase, and it may not fire at surface targets if it fired at the aircraft or missile targets during the same phase. As will be indicated later, a gun may fire at more than one aircraft or missile during a phase.

If all of the requirements are met, the gun mounts may be fired.

2. FIRING PROCEDURE:

a. The actual process of firing guns will be simultaneous for all units, but the process of sustaining damage, as will be explained below, is not simultaneous.

b. The player who moved second during preceding Movement Phase announces the targets for each of his firing ships. His opponent will then do the same.

c. Both players will then fire each gun in any order they desire. The steps required to fire each gun mount are as follows:

1. Resolve the use of the gun's FC radar, if any.

2. Measure range to the target.

3. Determine the battery's accuracy. This is done by consulting the proper Gunnery Accuracy Table found on the Gunnery Results Chart. Cross refer the firing range with the Fire Control Rating of the weapon being used (this is found on the Ship Characteristics Table) to determine the base accuracy figure, which will be a number between 1 and 12. Adjust this figure as indicated on the Accuracy Adjustment Table -- also found on the Gunnery Results Chart. A full description of these adjustments is given in rule 3 below. After adjusting the battery's base accuracy as indicated on the Accuracy Adjustment Table (and in rule 3 below), the result is the actual accuracy rate of the battery.

Note: If the resulting figure exceeds 12, the battery's accuracy is reduced to 12; if the resulting accuracy rate is less than 1, the battery's accuracy rate is assumed to be 1. If the Gunnery Accuracy Table does not give a base accuracy figure, no firing is possible.

4. Choose the type of ammunition being used.

5. Using the actual accuracy figure obtained, roll one decimal die for each firing **gun** and consult the Gunnery Firing Table. Cross refer the actual accuracy rate with the numbers rolled to determine the base number of damage points sustained by the target.

6. Adjust the number of base damage points as indicated in Rules 4 and 5 below to determine the actual number of damage points sustained and record on a piece of paper the name of the firing ship, the name of the target ship and the number of damage points sustained by the target.

d. Determine the damage sustained by each target ship in accordance with Rule 6 below.

3. ACCURACY ADJUSTMENTS:

a. Target size

1. Increase the accuracy rate by 1 if the target has a displacement exceeding 10,000 tons.

2. Decrease the accuracy rate by 2 if the target has a displacement of less than 1000 tons.

b. Target speed

1. Add 3 to the accuracy rate if the target is not moving.

2. Add 2 if its speed is less than or equal to 10 kts.

3. Add 1 if its speed is 11 - 20 kts.

4. Subtract 1 if the target's speed is 40 - 59 kts.

5. Subtract 2 if the target's speed is 60 - 79 kts.

6. Subtract 3 if the target's speed is 80 kts or more.

c. Turning

1. If the target pivoted 46-90° during the turn of firing, reduce the accuracy rate by 1.

2. If it turned over 90° or moved evasively, reduce the accuracy rate by 2.

3. If the firing ship pivoted 46-90° during the turn of firing, reduce the accuracy rate by 1 only if the firing ship's fire control rating is F, G, or H.

4. If the firing ship pivoted over 90° or moved evasively during the turn, reduce the accuracy rate by 1 if its fire control system is rated C, D or E; reduce accuracy by 2 if its fire control rating is F, G, or H. There is never any reduction due to the movement of the firing ship if the ship's fire control system is rated A or B.

5. If either the firing or target ship made an emergency turn, reduce the accuracy rate by an additional 1.

Example: If the target ship makes a 180° emergency turn, the accuracy rate will be reduced by 3.

Exception: If the firing ship makes an emergency turn but has a fire control system rated A or B, no accuracy penalty will occur, as the movement of a firing ship so equipped will never affect the accuracy of its guns.

6. If firing during the first combat phase of a turn, the player whose chance to move occurs during the second movement phase will not yet have had an opportunity to move. If one of his ships is firing or being fired upon, he must indicate before the resolution of any firing if such ships will pivot or "Move Evasively" during his subsequent movement phase. He will be required to move the ships accordingly during his Movement Phase (if it is still possible).

d. Ranging In: The accuracy of guns will be reduced due to the need for ranging in only during the combat phase that the target is initially fired upon by the firing ship. Ranging in reduces the ship's accuracy for only one combat phase. If the firing ship continues firing upon the same target during the following phase, there will be no ranging in penalty during the phase. However, if the firing ship shifts its fire onto

another target, it must range in again; also, if the firing ship ceases firing for one phase, it must again range in when it again opens fire even if it is firing on the same target.

Exception: If a firing ship shifts fire onto another target ship that is less than 3" (1 nautical mile) away from its prior target, ranging in is unnecessary.

Example: If a ship opens fire during the third combat phase of the game, its accuracy will be reduced for ranging in on that phase. If during the next combat phase it continues firing on the same target or begins firing on another target that is within 3" of the prior target, ranging in is unnecessary, so the accuracy of the gun fire will not be reduced for this reason. If, however, the firer switches to another target during that phase, ranging in is necessary. In addition, if the firer ceases firing for that combat phase, and during any subsequent phase reopens fire, ranging in is necessary regardless of the target.

The penalty for ranging in is dependent upon the rating of the Firer's Fire Control System:

A, B - 1
C, D, E - 2
F, G, H - 3
All ships not using a fire control radar - 1 additional
All Soviet designed ships - 1 additional

e. Range finder

1. Under normal conditions, ships will obtain range information from a fire control radar. However, if the fire control radar is not operating or engaging other targets, range information may be obtained from either the search radar or visual spotting. Visual spotting may be either director control or local control. Director control is more accurate than local control, but it cannot be used if the director has been knocked out, or either the director or fire control radar is being used on another target during the phase. See the Electronic Warfare Rules for further information on using search radars to secure range information.

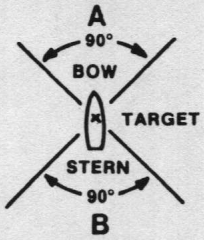
2. If a ship relies on its search radar for range data and the radar is TWS (see the Electronic Warfare Rules), subtract 1 from the accuracy rate.

3. If a ship relies on its search radar which is not TWS, subtract 2 from its accuracy rate; if it relies on visual spotting from its director, subtract 3 from the accuracy rate.

4. If a ship fires from local control, it will be treated as if its fire control system is rated H. If a ship's fire control system is rated H, it does not require information either from radar or from the gun director, so no reduction would apply.

Note: In order for a ship to receive information from a search or TWS radar, the radar must be operational and turned on; it is not necessary that the radar actually detect the target. Fire control radars, however, cannot provide any information unless they successfully track the target (see the Electronics Rules for further details).

f. Capping the T: A ship is considered to be Capping the T of an opposing ship if it is located off the bow or stern of the target. See the diagram below; if the firing ship is anywhere within the areas marked A, it is considered to be Capping the T of the target unit. If the firing ship is Capping the T of the target, reduce the firing ship's accuracy by 1.



4. AMMUNITION:
Each round consists of a combination of warhead, shell and fuse. During each combat phase, each gun battery may fire only one combination of warhead, shell and fuse types. The types available for use against ships as as follows:

a. Warheads:

1. Common H E (HE): This is the standard type of warhead used in anti-ship firing. It has a moderate size high explosive warhead and is designed to penetrate into a hull before exploding. The damage tables are based on H E ammunition.

2. High Capacity (H C): This is a high explosive warhead normally used against shore installations and small boats. It has more explosive charge than common ammunition, so it can cause more topside damage; however, it explodes on contact so it will do little damage below decks. When a ship scores hits with H C, increase the number of damage points scored by 1/3 (round fractions upward to nearest digit). However, when consulting the Gunfire Damage Chart, if the result indicates that a penetration is required, no damage will be sustained.

3. Shaped Charge (S C): Shaped Charge warheads are designed to penetrate armor plate. Shaped Charge rounds will penetrate any thickness of armor, but reduce the damage points scored by 50% when using Shaped Charges.

4. Semi-armor piercing (SAP): This type of ammunition has a smaller explosive charge than Common HE but will penetrate more armor. Reduce the damage points scored by 25% when using SAP.

b. Shell types:

1. The **common, unassisted shell** is the vehicle used to carry most warheads. All tables are based on using unassisted shells.

2. Rocket Assisted Projectile (RAP): When using RAP, the maximum range of the gun is extended by 1/3. When determining accuracy, reduce the actual range 1/3.

Example: If the actual range is 18", the accuracy of a RAP round will be the same as that of a normal round fired at a range of 12". RAP rounds may have HC, COM or Shaped Charge warheads, but in all cases, reduce the damage points scored by 25%

3. Long-Range Boost Assist Projectiles (LRBA): The same as RAP, but the gun's range is increased by 2/3 while the number of damage points scored is reduced by 50%.

4. Guided Projectiles: These projectiles are not yet operational, but they may be within a few years. Basically, these are shells which are guided by active or passive means to the target in a similar manner as missiles. Guided Projectiles will have a range equal to 1/3 less than the normal gun range. They may have a H C, H E or Shaped Charge warhead and may be rocket assisted (RAP) which would increase its range out to normal gun range in return for less damage capability. The actual accuracy rate of Guided Projectiles will always be 12.

c. Fuses

1. Standard - The standard fuse for HE and Shaped Charges is a delayed action fuse, while the standard fuse for HC is one that explodes on impact. The rules already take into account the action of these fuses.

2. Proximity fuse (VT) - These fuses can be used with any type of projectile and with any warhead except Shaped Charge. These fuses explode in the air over the target resulting in greater opportunity for damage to unprotected parts of the superstructure, but little damage elsewhere. To simulate this, if using VT fuses, increase the accuracy rate by 1. When determining damage (see 6 below), if the card is a club, spade or diamond, the damage will be sustained by the superstructure; if a heart, no damage will be sustained by the target even if the target is smaller than 1000 tons. When consulting the Superstructure Damage Table, ignore any Fire result or any result calling for vibration damage or damage to main gun or SAM mounts. All other damage will be sustained in the normal manner.

5. SHIP DESIGN AND SIZE:
a. If the target has a displacement of less than 1000 tons, increase the number of damage points scored by ½ (round downward if necessary to nearest full point).

b. If the target's displacement exceeds 10,000 tons, decrease damage by 1/3.

c. Soviet-designed ships are more susceptible to battle damage than are ships designed in NATO countries. To simulate this, increase the number of damage points scored when the target is a Soviet-designed ship by ¼ (round off to the nearest point if necessary); if the result ends in ½, round it **downward** to the nearest point. **Example:** If a Soviet ship sustains six damage points, increase the number of damage points to seven, not eight.

d. British and Canadian ships are exceptionally well built. Decrease the number of damage points sustained by British and Canadian ships by 1/6 (round off to nearest point if necessary; if the result ends in ½, round downward).

6. DETERMINING GUNNERY DAMAGE:

a. After all gunfire has been completed during a combat phase, add up the total number of damage points scored by both sides. The result will be the number of cards that must be randomly picked from the deck indicated in Item 2 of the Necessary Equipment Section of this rule book. Each card will resolve the effects of one damage point. Sometimes, however, during combat phases in which there is a great deal of gunfire, more damage points may be scored than the total number of available cards. When this occurs, keep track of the total number of cards each ship has on a piece of paper. In this case, draw only the number of cards needed in step (b) below (i.e., one card for every four damage points scored). When step (b) is completed, record on the piece of paper the number of cards each ship has remaining, then reshuffle all cards and draw the number needed for step (c). Continue in this manner until all damage is resolved.

b. After picking the cards, place one of them face down for every damage point being resolved next to the model of the ship that **caused** the damage. When this is completed, turn over simultaneously the number of **each ship's** cards equal to 25% of the total number of gunnery damage points scored by the ship during that phase. That is, if one card has been picked for every damage point scored that phase, turn over 25% of each ship's cards, but if the total number of cards picked equalled ¼ of the total number of damage points scored that turn, turn all of them over. If the total number of a ship's cards is not equally divisible by 4, round off the number of cards to be turned over **downward** to the nearest multiple of four. Thus, if a ship has scored four to seven points during a phase, turn over only one card; if it scored eight through eleven points, turn over two.

c. Take each of the cards turned over (one at a time) and do as follows:

1. Using the suit of the card, determine if any damage will be caused. If the target ship's displacement is under 1000 tons, it will sustain damage regardless of the suit. If the target ship's displacement is 1000 tons or over, it will sustain damage if the card is a club, spade or diamond. If damage is sustained, go on to Step (2).

2. Using the number on the card, consult the Area Hit Table for the gun being used to determine whether the target sustains the damage in the hull, superstructure, or deck.

3. Then, take two decimal dice and designate one as the ten's die and the other as the unit's die. Roll the dice and combine the ten's die with the unit's die to obtain a number between 01 and 00 (100). Using this number, consult the proper Gunnery Damage Table (hull, superstructure, or deck) to determine the damage sustained by the target. All of the damage sustained is cumulative, and it is assumed to occur simultaneously. See rule 7 below for the effects of gunnery damage.

d. After resolving all of the damage required in step (c), turn over one-third of the remaining number of each ship's cards (rounding off downward if necessary) and resolve the damage as in (c).

e. After resolving all of the damage required in step (d), turn over one-half of the remaining number of cards (rounding downward if necessary) and resolve the damage as in (c).

f. After resolving all of the damage required in step (e), turn over all of the remaining cards and resolve the remaining damage in the same manner.

g. As damage is sustained by a ship, keep track of it on the ship's TDD. The effects of all types of damage is explained in the Damage Rules section of this book.

Remember that the cards that are placed next to a ship represent the damage **caused by** the ship, not the damage the ship is to sustain itself.

7. EFFECTS OF GUNNERY DAMAGE:

a. All of the damage will be assumed to occur simultaneously and will be immediately effective.

b. If the damage affects the ship's speed, the speed loss will be effective during the next movement phase.

c. If the damage affects gunnery, the ship's fire power will be reduced as indicated beginning with the next combat phase, and **in addition,** the amount of damage it can cause during the remainder of the current combat phase will be affected as follows:

1. If the gunnery accuracy is reduced by 1 (due to the loss of radars, directors, damage to the fire control system, etc.), or the ship loses up to 1/3 of its operational guns, reduce by one-third the total number of cards remaining face down next to the damaged ship. Round the loss off upward if necessary. **Example:** If a ship has four cards remaining face down next to it, and it loses one-third of its guns, it loses two of those four cards. These cards are discarded immediately.

2. If the gunnery accuracy is reduced by 2 or the ship loses between 1/3 and 1/2 (inclusive) of its operational guns, reduce the number of the ship's remaining damage cards by 1/2.

3. If gunnery accuracy is reduced by 3 or the ship loses between 1/2 and 2/3 (inclusive) of its operational guns, reduce the number of the ship's remaining cards by 2/3.

4. If gunnery accuracy is reduced by 4 or the ship loses between 2/3 and 3/4 (inclusive) of its operational guns, reduce the number of the ship's remaining cards by 3/4.

5. If gunnery accuracy is reduced by 5 or the ship loses between 3/4 and 5/6 (inclusive) of its operational guns, reduce the number of the ship's remaining cards by 5/6.

6. If gunnery accuracy is reduced by 6 or more, or more than 5/6 of the ship's operational guns are knocked out, discard all of the remaining damage cards.

d. All of the damage caused by cards which are turned over at the same time is cumulative, so if a ship loses 1 from its gunnery accuracy (or 1/4 of its guns) based on one damage card and another 1 from its accuracy (or 1/4 of its guns) based on another card, it will lose 1/2 of its cards.

Example: If a ship firing two guns scored twenty damage points during a phase, it would have a pile of twenty cards placed near it. After this is done, five of these cards (25%) will be turned over simultaneously, and any damage caused by them will be sustained. If at the same time, this ship's fire control radar is knocked out, forcing it to rely on its search radar for range information, its accuracy rate will be reduced by 1 (per Rule 3 (e) above), so 1/3 of its remaining cards will be discarded, leaving it with ten cards not yet turned over. If one of the ship's guns is also knocked out, the number of remaining cards must be reduced by 1/2, since the ship has lost 1/2 of its currently operating guns. Thus, the ship has only five cards remaining next to it.

8. DAMAGE ADJUSTMENTS:

a. The Gunnery Damage Tables indicate the damage to be sustained by the target ship. All of the damage listed next to the number rolled must be sustained. If the ship does not have the equipment listed, or if the equipment listed has already been knocked out, the ship will usually sustain no damage. However, if a piece of equipment is listed in parentheses, **Example:** "1 Sec SAM FC radar (or 1 Main SAM FC radar)", that piece of equipment in parentheses will sustain the damage if the piece of equipment preceding it is already knocked out or non-existent; if the equipment preceding the parentheses is not yet knocked out, then it will sustain the damage, and the equipment listed in parentheses will be undamaged.

b. Some results are preceded by A, P or PA. Such results can only occur if the shell can penetrate the position indicated. See the Armor Penetration Rules for a full explanation. Frequently, another damage result will be given in parentheses next to these. If such is the case, the damage listed in parentheses will occur if the shell is unable to penetrate the position indicated, or if the position indicated has already been destroyed or was non-existent. If the position indicated by A, P or PA can be penetrated, the results indicated in parentheses will not occur. If no other result is listed in parentheses next to an A, P or PA result, no damage will be sustained if penetration does not occur.

c. Ships over 10,000 tons: If damage is sustained, ignore any result occuring after the first comma on the result line. **Example:** If the damage indicated by the table reads: "1 main SAM mount, 1 surface search radar KO", the ship will only lose the SAM mount, not the radar.

d. Ships of under 1000 tons: If the card governing the roll of dice is a heart, ignore any result occuring after the first comma on the result line. If the card is of any other suit, the ship will sustain all damage indicated.

e. Poor shock mountings: Many ships are listed on the Ship Data Chart as having poor shock mountings. Whenever such ships sustain gunnery damage, in addition to the damage indicated on the Gunnery Damage Table, look also at the damage result given for the number that is one higher than the number actually rolled (e.g. if a 22 was rolled, the ship will sustain the damage listed for number 22, but also

look at the damage result given for number 23). If that result indicates either engine damage or damage to any radar, radar detector or jammer, the ship will sustain that damage in addition to its normal damage. **Exception:** If the ship is larger than 10,000 tons, it will not sustain any additional damage if that damage occurs after the first comma in the result line). In all cases, the ship will sustain only the additional engine or electronics damage, not any other damage listed on the line. Also, if the ship sustains normal engine damage and the damage result given for the number that is one higher than the number rolled also calls for engine damage, the ship will sustain only the engine damage that is of the greater severity, it will not sustain both the engine damage indicated next to the number rolled and also the engine damage indicated on the next line.

f. Damage to Aircraft Carriers: In addition to the normal damage indicated by the Damage Table, aircraft carriers will also sustain the following damage:

1. If the deck is to sustain damage and the number rolled when consulting the Gunnery Damage Table is 01 through 10, one elevator is knocked out if the deck armor can be penetrated by the ammo used.

2. The suit of the card picked when consulting the Damage Table will determine if any aircraft are knocked out. If the carrier has twenty-five or fewer aircraft (and helicopters) on board at the time the damage is sustained, it will lose one aircraft (or helicopter) whenever a spade is picked. If the carrier has twenty-six through fifty planes on board, one will be destroyed whenever a spade or club is picked. If the carrier has fifty-one through seventy-five aircraft on board, one aircraft will be destroyed whenever a club, spade or diamond comes up. If the carrier has over seventy-five planes on board, one plane will be destroyed for every damage card.

3. Fires: Whenever an aircraft is destroyed, a level 1 fire will break out if the card picked to determine damage was a 1, 5, or 10. Also when consulting the Damage Table, look at the damage that is listed for the number that is one higher than the number actually rolled (e.g., if a 22 was rolled look at the damage indicated for number 23). If that result is a fire, the carrier will sustain that fire damage in addition to the damage indicated next to the number actually rolled.

Exceptions: If the ship is larger than 10,000 tons and the fire damage occurs after the first comma in the result line, it will not be sustained. Also, regardless of displacement, if the result indicated next to the number actually rolled calls for a fire to break out, and in addition, the result indicated by the number that is one higher than that actually rolled also indicates a fire, the ship will only sustain the higher of the two fire levels indicated; it will not sustain both (e.g. if a 21 is rolled and the result line calls for "Fire Level 1" and result number 22 indicates "Fire Level 2", the ship will only sustain a Level 2 fire.

4. Whenever a damage card indicates damage to a carrier's deck or superstructure, the carrier will sustain flight deck damage in addition to other damage (if any) indicated by the Damage Table. Flight deck damage is recorded in points. Normally, for every card indicating deck or superstructure damage, the carrier will sustain 50 points of flight deck damage; however, the following adjustment apply:

a. If the card is a heart, no flight deck damage occurs unless an aircraft is destroyed.

b. If an aircraft is destroyed by the same card, increase the damage by 50 points. If the card is a heart, the damage sustained will total only 50 points.

c. If the deck is hit and the ammo used can penetrate the deck armor, increase the damage by 50 points unless the card is a heart.

g. Damage to tankers and oilers: In addition to the normal damage sustained, look to the numbers that are either one or two higher or one or two lower than the number actually rolled. If any of these numbers indicate a fire, the ship will sustain the fire in addition to the normal damage. If several fires are indicated, the ship will sustain only the highest level indicated.

E.G. If a tanker (or oiler) is hit and the result number is 22, look at the results for numbers 20 through 24. If any of these indicate a fire, the ship will sustain only the highest fire level indicated.

9. ARMOR PENETRATION:

a. Most modern ships are unarmored, but the Ship Characteristics Table will indicate those which still carry armor and its thickness. Armor will prevent certain damage from occuring if the ammunition used is unable to penetrate the armor at the point indicated. The Damage Table indicates the damage which requires armor penetration. If the area hit is the hull, the belt armor must be penetrated for damage to occur; if the area hit is the deck, the deck armor must be penetrated. However, if the Damage Table indicates that a gun mount is to be knocked out if penetration occurs, only the turret armor must be penetrated.

Special: Certain aircraft carriers have hulls built of high tension steel which acts as armor; such ships can never sustain any hull damage unless the armor is penetrated, even if the Damage Table indicates that penetration is not required.

b. Armor penetration is as follows:

1. Common HE: Guns of 7" caliber or less which fire Common HE shells can penetrate only light belt and turret armor at all ranges; they cannot penetrate any deck armor. Guns of 8" caliber or more can penetrate moderate belt and turret armor out to six miles range (18"), and light belt and turret armor at all ranges. In addition, they can penetrate light deck armor at ranges equal to or **exceeding** twelve miles (36"); they cannot penetrate any deck armor at all at ranges of under twelve miles.

2. Shaped Charge: Shaped Charge rounds can penetrate any thickness of armor at any range regardless of the caliber of the gun.

3. Semi-armor Piercing Rounds: Guns of 7" caliber or less which fire SAP rounds can penetrate moderate belt and turret armor out to a range of six miles (18"), and light belt and turret armor at all ranges. In addition, they can penetrate light deck armor at ranges equal to or exceeding twelve miles (36"). Guns of 8" caliber or larger which fire SAP rounds can penetrate moderate and light belt and turret armor at all ranges, and can penetrate light deck armor at ranges equal to or exceeding nine miles (27").

4. High Capacity Rounds: This type of shell cannot penetrate any armor at all regardless of the caliber of the gun.

5. VT - Fused shells: Any shell equipped with a VT fuse cannot penetrate any armor at all.

10. FIRE CONTROL:

a. The accuracy of a ship's guns is based primarily on its fire control system which is rated A through H depending on its effectiveness. The accuracy figures given for systems A through G are based on the assumption that range data is being secured by a fire control radar. However, if the fire control radar is not operating, range data can be secured by one of these other, less efficient methods:

1. Search Radar: The Search Radar may be used to obtain range data, but as indicated in the Accuracy Adjustment Rules, the accuracy will be reduced.

2. Optical Sighting: If neither the fire control nor the Search Radar is operational, range data can be secured visually by the radar director (if it is operational). This is the least efficient method of securing range information, resulting in an accuracy reduction of 3 (per Rule 3 (e)). Gun directors are slaved to the fire control radar, so if the fire control radar is being used against one target, the director may not be used against another.

b. If neither the radars nor the directors are operational, or if the fire control system itself is not operation, guns may still be fired by local control. If this is done, the ship will be assumed to have a fire control system rating of H, so use that column on the Accuracy Table to determine accuracy. Local control can only be used if the target is visually sighted by the firing ship at the time of firing.

Note: Some guns are incapable of firing without radar fire control. The Gunnery Data Table will indicate which guns are under this restriction. Such guns may not fire by optical sighting or local control.

11. AUTOMATIC SELF-DEFENSE GUNS:

Many ships are equipped with secondary guns for close in fire against aircraft and missiles. Such guns are not tied into the main fire control system, so each will have its own FC rating. When firing such guns, use the FC rating pertaining to the guns being used. Most modern secondary guns are automatic and have an FC rating of A, even though the FC rating of the main battery is usually less. Such Secondary batteries will always have their own FC radars, and cannot use the main FC radar. If the secondary battery has an A FC rating, it may not be used if its FC radar is not operating; local control is impossible with such weapons. Many secondary guns are not capable of firing against ships. If no Gunnery Firing Table exists for a certain gun, this means that the weapon is incapable of engaging ships.

12. MANUAL OVERRIDE:
a. Some guns, most notably the US 5"/54 MK 42 found on most US DD's and similar ships, have the ability to be loaded by hand in addition to the normal automatic loading system. Hand loading is actually faster than automatic loading for short periods of time. To simulate this, players commanding a ship whose guns have manual override may announce that the ship will use manual loading. This may be done during any gun fire segment, just before the ship's guns are fired.

b. During that phase, double the number rolled for each such gun when consulting the Gunnery Damage Chart. If, after doubling, the resultant number exceeds 10, the ship will score the damage indicated next to number 10 on the Gunnery Damage Table, and it will also score the damage listed next to the remainder when 10 is subtracted from the doubled number.

Example: If a player rolls an 8, this is doubled to 16. The ship will score the damage listed for number 10, and it will also score the damage listed for number 6.

c. The same procedure will be followed during the phase after the phase in which manual override began; the number rolled will again be doubled. During the subsequent two phases, the number rolled will be increased by 50% (round upward to the nearest whole number if necessary). Thereafter, there will be no further increases.

d. The increases listed above can be given only during the phases specified. If the player does not take advantage of the bonus during the proper phase, he may not take the bonus at some time later.

e. A battery may begin manual override only once every ten turns. That is, if a battery used manual override it may not again begin manual override until ten full turns have elapsed since the first time manual override was begun.

f. The Gunnery Data Chart will indicate which guns have a manual override capability.

XI. DAMAGE:

1. EFFECTS OF DAMAGE:
a. Weapons Systems: When a damage table indicates that a weapon's mount is knocked out, all weapons in that mount will be unable to function as soon as the damage occurs.

Example: If a twin gun mount is knocked out, both guns will be inoperable.

b. Radars, radar detectors, sonar and jammers: When the damage table indicates that such a device is knocked out, the device indicated will immediately cease functioning.

c. Gun directors: When a gun director is knocked out, it will immediately cease functioning, and, in addition, one gun fire control radar is also knocked out and ceases functioning. The guns controlled by that director and radar may still fire by local control. When firing a gun by local control, assume its fire control system rating is H, rather than its normal rating.

d. Bridge: On most modern ships, the bridge is usually vacant during general quarters; all fighting and navigating occurs in the CIC. However, the bridge can operate as a secondary command point if the CIC is knocked out. Therefore, if a ship's CIC is operating, a hit on the bridge will have no effect. However, if the CIC has already been knocked out, a ship sustaining subsequent bridge damage must move directly forward for one full turn. The ship may not accelerate, decelerate, or move evasively. After one full turn is completed, the ship may move normally.

e. Communications: When a ship's communications are knocked out, it will be unable to receive or pass on movement information unless laser signalling is available. Such ships must remain within 3" of the flagship or be part of a chain of ships that are within 3" of each other and one of which is the flagship. If the ship without communications is not within 3" of the flagship, or part of the chain of ships, it must be moved directly toward the flagship (unless evading missiles or torpedoes). If the flagship loses its communications, all other ships must be within 3" of it or be part of a chain of ships within 3" of each other and one of which is the flagship. Ships with laser signalling can continue receiving and passing on information to units within daylight visual sighting range so that they are not required to remain with 3" of any ship.

Ships without communications cannot receive or pass on target information except via data link, if operational. Thus, it will be unable to take any action against targets or missiles, etc., which are not directly visible to it or located by its own sensors, nor may any other unit take action against any target, missile, etc. that has only been located by the ship without communications. Of course, if the data link is operational, the ship can pass on and receive all target information via the data link with any other ship possessing the data link (see the Data Link rules in the Electronics Section).

f. Data Link: If the data link is knocked out, it becomes of course, immediately inoperable. See the Electronics Section for data link information.

g. Steering circuits and rudder damage: Any ship sustaining damage to the rudder or steering circuits must move directly forward until the damage is repaired.

h. Generators: Most ships have a number of generators (usually about four). If a ship has at least two generators functioning, it may operate in the normal manner. If a ship has only one generator functioning, it may move at up to 75% of its maximum speed, but it may not use any radars, sonars, radar detectors or jammers. In addition, it may fire no weapons except those capable of being manually operated. If a ship loses all of its generators, it may not move, use any radar, sonar, radar detector or jammer, or fire any weapon other than small, manually operated ones.

i. Combat Information Center (CIC): If the CIC on a NATO designed ship is knocked out, the ship will be unable to fire any weapons other than those with a local control facility. In addition, the Fire Control System rating will immediately drop to H. The ship must also move directly forward, without turning, accelerating, decelerating or moving evasively for one full turn.

If the CIC on a Soviet or Chinese designed ship is knocked out, roll one six-sided die to determine which weapons control system has been knocked out:

1. SAM
2. Gun
3. SSM
4. ASW
5, 6: Roll again until 1-4 is rolled.

Roll again, if the system indicated by the table has already been destroyed. Only the weapon system indicated by the die roll will be affected, all other weapon systems will continue to operate normally.

j. Fire Control System: If a fire control system is knocked out, firing will only be possible for the weapons by local control. The fire control rating of the ship is immediately reduced to H. In addition, the data link will cease to function if all fire control systems are knocked out.

k. Magazine: If a magazine explodes, determine whether the explosion occured in the bow or the stern. If all of the ships guns are located in the bow of the ship, the explosion occured in the bow; if all are located in the stern, the explosion occurred in the stern. If the ship has guns both in the bow and the stern, roll one six-sided die; if there are an equal number of guns on both the bow and the stern, the explosion is in the bow if the roll is 1/2/3 and in the stern if the roll is 4/5/6. If the ship has more guns in one area than in another, the explosion will occur in the area having the most guns on a roll of 1/2/3 or 4 and in the other area if the roll is 5/6.

Regardless of where the explosion occurred, all sonar, radar, radar detectors and jammers are knocked out. The ship will also sustain 1200 points of Flooding damage. If the explosion occurred in the bow, all weapons forward of the bridge are knocked out; if the explosion occurred in the stern, all weapons aft of the bridge are knocked out, and in addition, propeller damage is sustained. Roll one six-sided die to determine additional damage.

0, 1 - All generators KO, very severe engine damage, all main FC systems KO, fire level 6; increase flooding by 600 points.

2 - Very severe engine damage, all main FC systems KO, fire level 6, two generators KO.

3 - Very severe engine damage, all main FC systems KO, two generators KO, increase flooding by 600 points, fire level 4.

4 - Major engine damage, two generators KO, fire level 6.

5 - Major engine damage, one generator KO, fire level 4.

6, 7 - Moderate engine damage, one generator KO, fire level 4.

Subtract 1 from the roll for Soviet and Chinese designed ships; add 1 for British and Canadian designed ships.

l. Propeller: If a propeller is knocked out, the ship's maximum speed will normally be reduced by 50%. However, if the ship has only one

propeller, it is dead in the water. Also, if a ship suffers propeller damage due to a magazine explosion, it is dead in the water.

m. Engines: If a ship sustains engine damage, its maximum speed will be reduced as indicated below:

Minor damage -- lose 5 kts.
Moderate damage -- lose 10 kts.
Major damage -- lose 50% of the maximum speed.
Very severe damage -- ship is dead in the water.

All Soviet-designed ships, all merchant ships, and all ships with only one engine will lose double the amount indicated above (e.g., they will lose 20 kts if moderate damage is sustained).

British and Canadian designed ships will lose only 1/2 of the speed loss indicated above.

n. Flooding: As indicated in the Flotation Rules below, each ship can take a certain amount of flooding before it sinks. The amount of flooding is recorded in units called Flotation Points. The number of Flotation Points a ship sustains is based on the severity of the flooding and the weapon causing it:

Severity	Gunfire	Missiles and Torps.
Very minor flooding	--	1/4 x FD rating
Minor flooding	50 points	1/2 x FD rating
Normal flooding	100 points	FD rating
Heavy flooding	150 points	1½ x FD rating
Very heavy flooding	200 points	2 x FD rating

The FD (Flotation Damage) ratings of missiles and torpedoes are found on their respective data charts. The FD rating is a measurement of the amount of flooding that will normally be caused by a single hit with that weapon.

o. Fire: Whenever the damage table indicates that a fire breaks out, add the fire level indicated to any other fire already existing in accordance with Rule 3 below. The damage caused by fire is also explained in Rule 3.

p. Electronic damage: Whenever a damage table indicates that a ship sustains minor electronics damage, roll a decimal die and consult the table below to determine which piece of electronic equipment is knocked out. If the ship sustains severe electronics damage, roll the die two times, and the ship will lose both pieces of equipment. If it sustains very severe electronics damage, roll the die three times. Double the number of required rolls if the ship had over six radar sets at the beginning of the game. If the ship does not have the equipment listed on the table or if it has already been knocked out, roll again until the table calls for damage to equipment which is in working order:

1 - Air Search Radar
2 - Surface Search Radar
3 - Main Gun FC Radar
4 - Main Gun FC Radar
5 - Sec Gun FC Radar
6 - Sec SAM FC Radar
7 - SSM FC Radar
8 - Radar Detector
9 - Radar Jammer
10 - Sonar

If the results table indicates that all electronics are knocked out, all radars, sonars, radar detectors and jammers are knocked out.

q. Elevator Damage: As will be explained in the Aircraft Operations Segment of the rules, Aircraft Carriers which sustain elevator damage will have their ability to launch and recover planes reduced.

r. Flight Deck Damage: Aircraft carriers which have unrepaired flight deck damage will be unable to launch and/or recover aircraft. See the Aircraft Operations segment for further details.

s. Weapons Damage: Whenever a damage table indicates weapons damage, roll a decimal die and consult the table below to determine which weapon is knocked out. If the Damage Table indicates minor damage, roll the die once; if it indicates major weapons damage, roll the die two times. If the target does not have the weapon indicated in the table below, roll again until the table indicates a weapon that is still operational on the target.

Number Rolled	Weapon Knocked Out
1	1 Main gun mount
2	1 Main SAM mount
3	1 Main ASW mount
4	1 SSM mount
5	1 Torpedo bank
6	1 Chaff launcher
7	1 Sec. gun mount
8	1 Sec. SAM mount
9	1 Sec. ASW mount
10	One Sec. gun and One Sec. SAM mount

Note: Whenever a ship suffers a speed loss due to **any** cause, it will decelerate automatically to its new speed at the end of the combat phase, a ship need not follow normal deceleration rules when battle damage reduces its speed.

2. FLOTATION:

a. Whenever a ship sustains flooding damage, it will receive a certain number of flotation points which represents the amount of flooding the ship sustains. Undamaged ships have no flotation points. Flooding damage is cumulative, so keep a running total of the number of flotation points received by each ship. When the number of flotation points received by a ship exceeds its maximum Flotation Allowance, the ship will sink. The maximum Flotation Allowance for a ship never changes.

b. A ship's Maximum Flotation Allowance, is a number of points equal to its displacement in tons. Thus, the Maximum Flotation Allowance of a 10,000 ton ship is 10,000 points. Adjust this as follows:

1. Reduce it by 1/4 (round the loss downward to the nearest point) for all Soviet warships.

2. Increase by 1/6 for all British and Canadian warships.

3. Reduce it by 1/2 for merchant ships and all normal tankers.

4. Reduce it by 3/4 for super-tankers.

c. The effects of flotation damage are as follows:

1. As soon as a ship sustains cumulative flotation damage equal to 25% of its Maximum Flotation Allowance, its maximum speed is reduced by 5 kts. In addition, roll one six-sided die; if a 1 is rolled, one main gun mount is also knocked out, while if a 2 is rolled, one main SAM mount is knocked out. Otherwise, there is no damage.

2. As soon as a ship sustains cumulative Flotation damage equal to 50% of its Maximum Flotation Allowance, its maximum speed will be reduced by another 5 kts. Roll the six-sided die (as in (1) above) to determine if any guns or SAMs are knocked out. Aircraft carriers will be unable to launch or recover aircraft as soon as their cumulative flotation damage equals 50% or more of the Maximum Flotation Allowance.

3. As soon as a ship sustains cumulative flotation damage equal to 75% of its Maximum Flotation Allowance, its maximum speed will be reduced by another 5 kts. Roll the six-sided die again (as in (1) above) to determine if any gun or SAM's short-circuit.

4. Whenever the number of flotation points sustained by a ship exceeds its Maximum Flotation Allowance, the ship is sinking. Ships which are sinking are not capable of any activity whatsoever; that is, the ship may not move, fire, use any active or passive sensors, visually sight, etc. The crew must immediately abandon ship, and no further damage control activities are possible. If the total number of flotation points sustained by a ship equals 25% more than its Maximum Flotation Allowance, it sinks immediately and is removed from play. If it is sinking but the number of flotation points is less than 25% more than the Maximum Flotation Allowance, the ship does not immediately sink and remains on the playing surface. Pick one card at the end of each friendly movement phase for every friendly ship in this condition. If the card picked is an ace of spades, the ship immediately sinks; otherwise, it remains afloat.

3. FIRE:

a. Fire on a ship is measured in levels. A level 1 (one) fire is a minor fire. The maximum fire level possible is thirty-two. All fires are cumulative, so two level one fires equal one level two fire; two level two fires equal one level four fire, etc. If a ship is on fire, it will be affected as follows:

1. Levels 1 - 8 - No effect.

2. Levels 9 - 16 - Subtract 1 from accuracy rates if using visual sighting for fire control. In addition, as soon as the fire level exceeds 8, the ship will sustain minor engine damage. It will not sustain further engine damage due to fire until the fire level exceeds 16.

Example: If the fire level on a ship becomes 9, it immediately suffers minor engine damage per Rule 1 (m); it will not sustain further damage when the fire level reaches 10, 11, 12, etc. up to 16.

3. Levels 17 - 24 - Subtract 2 from accuracy rates if using visual sighting for fire control. In addition, as soon as the fire level exceeds 16, the ship will sustain moderate engine damage (per

Rule 1(m)). Also, roll one six-sided die and consult the table below for additional damage:

1 - One main gun mount KO.

2 - One main SAM mount KO.

3 - One main ASW mount KO.

4 - All SSM mounts KO.

5 - One secondary gun mount and one secondary SAM mount KO. In addition, roll the die again for additional damage.

6 - All fire control systems KO.

Both the engine damage and the additional damage will occur as soon as the fire level exceeds 16; no further damage due to fire will occur until the fire level exceeds 24.

4. Levels 25 - 32 - The ship becomes dead in the water and all weapons are inoperable.

5. Levels 33 or higher - The ship is in a sinking condition and is assumed to have suffered flotation damage exceeding its Maximum Flotation Allowance (see Rule 2, c (4)).

Special: Ships with aluminum superstructures (such as most US-designed ships) will sustain fire damage as if the fire level were 50% higher than it actually is (round the increase downward if necessary). Thus, such ships which actually have a level 4 fire raging will be treated as if the fire level were actually 6. The ship is in a sinking condition as soon as the fire level reaches 22, since 22 increased by 50% equals 33. All US-designed ships, except for aircraft carriers, are considered to have aluminum superstructures.

XII. DAMAGE CONTROL (Optional):

1. DAMAGE CONTROL - BASIC RULES:
During the damage control segments of the turns, both players will resolve all damage control attempts of each of their ships. Each ship has a number of damage control parties, each of which can be assigned to accomplish one task. For each of his ships, one at a time, the owning player will assign each of the ship's damage control parties to a task and will then roll one decimal die for each task undertaken to determine the outcome.

2. DAMAGE CONTROL PARTIES AND TASKS:

a. The number of damage control parties on board a ship is dependent upon its size:

1. Ships of under 1000 tons and all merchants - 2 parties.

2. Ships of 1000 - 10,000 tons - 3 parties.

3. Ships of over 10,000 tons - 5 parties.

Increase the number of parties by two if the ship is an aircraft carrier.

b. If not a single one of a ship's crew-served weapons is fired during a phase, the owning player may increase the number of damage parties by two beginning with that phase. If he chooses to do so, none of the ship's crew-served weapons may be fired during the phases in which the number of damage parties is increased and also during the phase following the phase in which this occurs. Crew-served weapons are all weapons which require at least one man to operate; fully automatic weapons which require no crew, such as the US Phalanx-Vulcan System, may be fired even when the number of damage parties is increased.

c. If two friendly ships are within 1" of each other and neither moved (nor will move) over 1" during the turn, all of the damage control parties on **both** ships may be used to repair damage on **one** of them.

d. The possible tasks to which damage control parties can be assigned are:

1. Flooding control.
2. Fire fighting.
3. Weapons repair.
4. Propulsion system repair.
5. Electrical equipment repair.
6. Flight deck repair.

Each damage control party can be assigned to only one task per phase, but more than one party can be assigned to the same task.

e. The damage control parties on all Soviet, Warsaw Pact, Chinese, and Soviet-allied ships may be assigned to flooding control, fire fighting, and flight deck repair only; they are not capable of attempting weapons repair, propulsion system repair, or electronic equipment repair.

3. DETERMINING SUCCESS OF DAMAGE CONTROL ATTEMPTS:
After all of a ship's damage control parties are assigned to a task, roll one decimal die for each task attempted to determine the results. Adjust the die roll as follows:

+1 for every damage control party assigned to the task other than the initial party. That is, if one party is assigned to the task, there will be no die roll increase. However, if two parties are assigned, increase the roll by 1; if three are assigned increase by 2; if four are assigned, increase the roll by 3, etc.

4. FLOODING CONTROL:

a. Whenever a ship sustains Flooding damage, it will immediately receive the number of flotation points indicated by the damage table. At the end of each damage control phase in which the Flooding is not "Controlled", the ship will receive additional Flotation points equal to 10% of the amount of uncontrolled Flooding (round upward to the nearest point if necessary). The additional flotation points are also considered uncontrolled flooding, so if the flooding remains uncontrolled during the next damage control phase, the additional flotation points will be added to the original amount of uncontrolled flooding when determining how many more Flotation points the ship will receive.

Example: If a ship sustains 100 points of flotation damage which remains uncontrolled at the end of the subsequent damage control segment of the phase, it will then receive an additional 10 points. If the flooding remains uncontrolled at the end of the next damage control phase, it will receive additional damage equal to 11 points (100 +10x 10%).

b. If a ship is engaged in flooding control, all uncontrolled flooding will become controlled if the proper number is rolled. The proper number is as follows:

1. If the amount of uncontrolled flooding is equal to or less than 25% of the ship's Maximum Flotation Allowance, the number rolled must be 5 or higher.

2. If the amount of uncontrolled flooding is greater than 25% but less than or equal to 50% of the ship's Maximum Flotation Allowance, the number rolled must be 7 or higher.

3. If the amount of uncontrolled flooding is greater than 50% but less than or equal to 75% of the ship's Maximum Flotation Allowance, the number rolled must be 8 or higher.

4. If the amount of uncontrolled flooding is greater than 75% of the ship's Maximum Flotation Allowance, the number rolled must be 9 or higher.

As always, a roll of 0 is considered to be a roll of 10. The die roll will be adjusted as in Rule 3 above; and in addition, the following adjustments will apply to attempts to control flooding:

- 1 for all Soviet and Warsaw Pact warships and all warships from countries other than NATO or Israel.

- 2 for all merchant ships except super-tankers.

- 3 for super-tankers.

c. Once flooding is controlled, no additional flotation hits will be received. However, controlled flooding will remain controlled only if at least one of the ship's damage control parties is assigned to flooding control during every damage control phase. If at least one party is assigned to flooding control, the flooding will automatically remain controlled; if no party is assigned to flooding control, all controlled flooding will again become uncontrolled, and the proper die roll will be needed to again bring it under control. Any party assigned to flooding control can attempt to control new flooding while at the same time keeping old flooding under control. Such parties are not penalized in any way in their attempts to perform either function.

d. Damage control parties assigned to flooding control may be able to reduce the amount of **controlled** flooding the ship sustained. This may only be attempted during phases in which there is no uncontrolled flooding. If the number rolled is 9 or 0 (after any adjustments indicated in Rule 3), reduce the amount of controlled flotation damage as follows:

NATO and Israeli warships -	25 points
Soviet and all other warships -	15 points
All merchants except super-tankers -	10 points
Super-tankers -	5 points

The ship will be treated as if this flooding never occurred, but if speed or armament was lost due to the flooding (per Damage Rule 2 above), it will **not** be regained until repaired by a weapons or propulsion system repair party.

5. FIRE FIGHTING:

a. Whenever a fire breaks out on a ship, it is liable to increase in intensity until it is controlled. At the end of any damage control phase in which a fire is not controlled, increase the fire by the number of levels equal to 10% of the number of uncontrolled levels (round upward to the nearest level if necessary).

b. If at least one of the ship's damage control parties is engaged in fire fighting, all uncontrolled fires on the ship will come under control if the proper numbers are rolled. First, roll the decimal die as indicated in Rule 3 above. If the number rolled after adjustment is 0 or more (0 equals 10), there is a chance that the fire will come under control. If the proper number was rolled, roll again and adjust the number rolled as follows:

- 2 for all Soviet and Warsaw Pact warships and all warships from countries other than NATO or Israel.

- 1 for all aircraft carriers.

- 2 for all merchants except super-tankers.

- 3 for super-tankers.

If the number rolled, after this adjustment, is **greater than** or equal to the number given below, the fire comes under control immediately. The required numbers are based on the total amount of uncontrolled fires raging on the ship:

Uncontrolled fire level	**Required to control**
Level 1 - 8	5 or higher
Level 9 - 16	6 or higher
Level 17 - 24	7 or higher
Level 25 - 32	8 or higher

A roll of 0 is considered to be a roll of 10.

c. Once an uncontrolled fire becomes controlled, it can no longer increase in intensity. However, to determine the effects of fire on a ship (per Damage Rule 3 above), total up both the controlled and uncontrolled fires on board. Thus, if a ship has a level 2 controlled fire and then sustains damage resulting in a level 4 fire, the ship will be considered to have a level 6 fire. The only advantage resulting from controlling fires is that controlled fires will not continue to increase in intensity.

d. A controlled fire will remain controlled only if at least one of the ship's damage control parties is assigned to fire fighting during every damage control phase. If at least one party is assigned to fire fighting, all controlled fires will automatically remain controlled. If no party is assigned to fire fighting, all of the fires automatically become uncontrolled and the proper die roll (per (b) above) will be needed to again bring it under control. Any party assigned to fire fighting may attempt to bring new fires under control while at the same time keeping old fires under control without any penalty.

e. Damage control parties assigned to fire fighting may attempt to reduce the level of **controlled** fires. This can only be accomplished during damage control phases in which there are no uncontrolled fires on board; it may not be attempted when there is any uncontrolled fire on board, regardless of its intensity. If the number rolled is 0, reduce the intensity of the controlled fires on board by one level if the ship is a NATO or Israeli warship. If the ship is not one of these, roll the die again; if the number rolled is equal to or greater than the number given below, reduce the fire by one level, but if not, the fire level will not be reduced:

Soviet, Warsaw PACT and all warships other than NATO and Israeli	- 4
All merchants except super-tankers	- 7
Super-tankers	- 9

If the fire resulted in loss of speed or armaments, these will not be regained automatically if the fire is reduced below the level that resulted in the loss; they must be repaired by a propulsion system or weapons damage control party.

6. WEAPONS REPAIR:

a. Before initially assigning a repair party to weapons repair, the player must indicate which weapons mount he wishes to repair and roll one six-sided die. If the number rolled is 1 through 5, the weapon mount cannot be repaired for the duration of the game; if a 6 is rolled, it may be repaired. This die roll occurs before the player assigns tasks to his damage control parties, so if the desired weapons mounts cannot be repaired, he may assign the parties to other tasks. The player may roll the die only once per weapon mount during each game, but he may roll for as many mounts as possible during each damage control phase.

b. If at least one mount can be repaired, roll the decimal die as indicated in Rule 3 above once every damage control phase. If the roll is a 0, roll the decimal die again and adjust as follows:

- 1 for all warships other than those of NATO or Israel.

- 2 if the ship is an armed merchant.

If the resulting roll, after adjustment, is 8 or higher (0=10), one of the weapons mount is repaired (owning player's choice) and may again function normally.

7. ELECTRONICS REPAIR:

This category includes all active and passive sensors, radar receivers, and jammers, FC systems, all communication and data link equipment and steering circuits. As for weapons system, the player must specify which piece of equipment he wishes to repair and then roll one six-sided die per equipment indicated to determine if it can be repaired. (He may roll only once for each piece of equipment.) Steering circuits can always be repaired regardless of the die roll, but all other equipment can be repaired only if a 4, 5 or 6 was rolled.

If at least one electronic equipment piece can be repaired, roll the decimal die as indicated in Rule 3 during every damage control phase. If the number rolled is 8 or higher, the steering circuits can be repaired. If the number rolled is a 0, roll the decimal die again and adjust as follows:

- 1 for all other warships except for NATO and Israeli vessels.

- 2 for all merchants except super-tankers.

- 3 for super-tankers.

If the number rolled after adjustment is 7 or higher, any one piece of electronic equipment is repaired.

8. PROPULSION SYSTEM REPAIR:

a. Damage repair parties assigned to propulsion system repair may repair engine damage, generator damage, rudder damage, and propeller damage. As for weapons damage, the player must specify which piece of equipment he wishes to repair and then roll one six-sided die to determine if it can be repaired. While a player may roll only once per game for the rudder and propeller, he may roll once for each generator, but he may roll for the engines a total of four times:

1. When the speed loss due to damage equals 25% or less of the ships maximum speed.

2. When the speed loss due to damage is greater than 25% but less than or equal to 50% of the ship's maximum speed.

3. When the speed loss due to damage is greater than 50% but less than or equal to 75% of the ship's maximum speed.

4. When the speed loss due to damage exceeds 75% of the ship's maximum speed.

The player may roll only once during each of the four opportunities listed above.

Example: If the ship loses some speed due to damage and the player rolls to determine if the damage can be repaired, he may not roll again if the ship sustains additional engine damage but the total engine

damage did not reduce the ship's speed by over 25%. He may not roll again until the speed loss due to engine damage exceeds 25% of the ship's maximum speed.

If a player does not roll to determine if engine damage can be repaired when the initial opportunity arises, then the amount of engine damage increases to the point where he would receive another opportunity to roll, he may roll both for the current opportunity and all opportunities not yet rolled for.

Example: If a ship sustains engine damage that reduces its speed by less than 25% and then later sustains additional engine damage resulting in a total speed loss due to engine damage of between 25% and 50% of its maximum speed (or if it sustains engine damage resulting in a speed loss of over 25% all at once), the player may roll the die two times. He may even roll the both times during the same damage control phase.

b. The numbers needed on the six-sided die to allow the possibility of repairs are as follows:

1. Generator	-	3 or higher
2. Rudder and propeller	-	6
3. Engines	-	5 or 6

c. If at least one of the elements listed above can be repaired, roll the decimal die as indicated in Rule 3 during the damage control phase. If the number rolled is 9 or 0, roll the decimal die again and adjust as follows:

- 1 for all warships other than those of NATO and Israel.

- 2 for all merchants except super-tankers.

- 3 for all super-tankers.

If the number rolled, after adjustment, is 1 or higher, one generator may be repaired; if the number rolled is 9 or 0, the rudder, propeller or engine may be repaired immediately. Only one piece of equipment may be repaired each damage control phase. If a generator, rudder, or propeller is repaired, it may be put back in use immediately. If an engine is repaired, immediately increase the ship's speed by 25% of its maximum speed.

9. FLIGHT DECK REPAIR (aircraft carriers only):
a. Damage repair parties assigned to Flight Deck repair will attempt to repair aircraft elevators in addition to repairing flight deck damage. All flight deck damage can be repaired unless the damage table indicates otherwise. For elevator damage, the player must roll a six-sided die before attempting any elevator repair. If the roll is 5 or 6, the elevator can be repaired; otherwise, it is out of action for the entire game.

b. When at least one damage control party is assigned to flight deck repair, roll the decimal die as indicated in Rule 3 once per damage control phase. If the number rolled is 6 through 0, the amount of flight deck damage may be reduced as follows:

NATO and Israeli ships	- 200 points
Soviet, Warsaw Pact and all other ships	- 150 points

c. If the number rolled is 0, the owning player may attempt to repair an elevator rather than repairing the flight deck; a ship may not both attempt to repair an elevator and repair any amount of flight deck damage during the same damage control phase. If the player chooses that the ship attempt to repair an elevator, roll another decimal die and adjust as follows:

- 1 for Soviet, Warsaw Pact and all ships other than NATO and Israeli vessels.

If the number rolled, after the adjustment is 9 or 0, one elevator is repaired and may again be used.

XIII. COMMUNICATIONS AND DATA LINK:

1. COMMUNICATION:
Communications refers to the ability of units to pass on and receive information from one to the other. There are two types of communications: Short range and Long range. The most common method of communication is by radio, but short range communication may also be carried out by signals. Data Link is a specialized form of communication in which the computer of a unit has the ability to exchange data directly with the computer of another unit. While all units are capable of both long and short range communication by both radio and signals, not all are capable of data link.

2. SHORT RANGE COMMUNICATIONS:
a. A unit with a working radio can communicate with another unit having a working radio by a system called TBS (talk between ships). In order to do so, the distance between the ships must be less than or equal to the maximum radar detection range, for this is the maximum range that such communication can be effective. Maximum radar detection range is based on the size of the ships communicating with each other, and these ranges can be found on the Radar Detection Table. TBS communication has the advantage of being directional, that is, the radio waves travel only in a line between the two communicating units, so it can be detected and jammed only if an opposing unit lies directly between the communicating units.

b. Short range communication can also be accomplished by signals if the communicating units are within 3" of each other. Communication by signal cannot be jammed and can only be detected by opposing units within 3" of the unit that is sending the message. However, unlike with radio communications, units may never fire weapons based on information received by signals. Units that are in communication only by signals are considered not in communication for firing purposes.

c. There is an underwater radio which allows communication between ships and subs and between subs and subs. It is omni-directional (like long range communications) and can be detected by all opposing units in range. The maximum range for communication between ships and a sub is 18" while the maximum range between subs is 27".

3. LONG RANGE COMMUNICATIONS:
a. Long range communication may only be accomplished by radio. Unlike TBS, long range communication is practically unlimited in range, but unless satellite relays are used, long range communication must be omni-directional, so it can be detected and jammed by opposing units which do not lie directly between the communicating units. The radio detection rules given in the Electronic Warfare Rule segment will give the requirements for radio detection and jamming.

b. One method of overcoming the ease at which long range radio transmissions can be detected is by the use of satellite relays. This can only be used if there is a communication satellite orbiting over the battle area. When communicating with a satellite, a directional radio, similar to TBS, is used, and the transmissions can never be detected since it would be practically impossible for any opposing unit to be directly between the satellite and the communicating unit for any length of time. When the satellite receives the transmission, it will retransmit the message to a receiving station also using directional radio signals. Thus, when satellite relay is used, communication may never be detected or jammed.

4. USES OF COMMUNICATION:
a. Long range communication will be used by long range recon units to communicate with other units or their base whenever enemy sightings occur. Usually, in a game the use of long range communication will occur only if scenario requires it. **Example:** A scenario might have a small recon force that must report any enemy contact back to base. Unless the scenario requires the use of long range communication under certain circumstances, it will probably be unnecessary to use it.

b. Short range communication will be used to transmit target information between ships, and to guide missiles capable of mid-course guidance. In addition, it is used to transmit orders from the flagship to all other ships.

5. EFFECTS OF COMMUNICATION:
a. Ships which are in communication with their flagship may be moved as desired. Those not in communication with the flagship must move as indicated in XI, 1, e.

b. Whenever a unit detects opposing units by any method, all friendly units in communication with the detecting unit are assumed to be made aware of the contact during the communications phase following the combat phase in which the detection occurred. The designations of all detected units are then written onto the TDD's of all units in communication with the detecting units. Units which are made aware of an enemy contact through communications are treated as if they, themselves, detected the units beginning at the time they receive the communication; thereafter, they may use weapons and fire control radars against those opposing units. For example, if a unit detects an opposing unit with radar during a combat phase, all units in communication with that unit become aware of that contact during the subsequent communications phase. Therefore, during the next combat phase, all of those units will be able to use fire control radars and weapons against the opposing unit just as if they detected it themselves.

Note: Many weapons are incapable of being fired unless the target is successfully tracked by a fire control radar. Units in communication with a tracking unit are **not** assumed to be tracking the unit themselves,

so they may not fire radar controlled weapons at the target. In order to fire radar controlled weapons, a unit must either track the target with its own fire control radar or have a data link connection (see below) with the tracking unit; merely being in communication with the tracking unit is not sufficient. The concept of radar tracking and fire control is explained in the Electronic Warfare section of this book.

6. DATA LINK:
a. Data Link, called NTDS in the US Navy, is a method of communication between computers. Only ships listed on the Ship Characteristics Table as having data link may use it, and both units involved in the communication must have it in order for communication to be possible.

b. Data Link is a directional communication system, similar to TBS, so it can be detected and jammed only if an opposing unit lies directly between the communicating units.

c. If units are connected by Data Link, all information available to one of the units is also immediately available to the other unit. If one unit has contacted an opposing unit, all units with a Data Link connection with that unit may fire weapons or use ECM, just as if they themselves made contact in the same way. Thus, units connected by Data Link can react to an enemy contact just as quickly as the unit actually making the contact.

7. COMMUNICATION PROCEDURES:
a. Long range communication — Whenever a unit uses long range communication, unless via satellite relay, the owning player must indicate the transmitting unit. This unit will immediately be detected by all opposing radio detectors. Long range communication is resolved during the communications phases of the turn.

b. Short range communication — Short range communication can be used during the communications phases of the turn. If a player uses short range communications, he must indicate it only if an opposing unit lies directly between the communicating units. If there is such a unit, the communicating player must point out the unit to his opponent and ask him if it has an operating radio detector. The opposing player need not reveal this information unless he wishes to do so. If he indicates that the unit does have a radio detector, the communicating player must indicate which unit is transmitting; that unit will automatically be detected by the radio detector.

c. Data Link — Although data link can provide detailed information very rapidly, it does not always work. Frequently units with data link will be unable to use it due to a malfunction in the system. To simulate this, at the beginning of each electronics search segment, pick one card for every unit having data link. If the number picked is 1 for NATO units or 1 or 2 for Soviet units, the unit's data link system will not operate during that phase. Such units can neither transmit nor receive information.

If a unit has a working data link, any contacts made by any of the unit's active or passive sensors will immediately be transmitted to all other units having a working data link. Thus, if the designation of an opposing unit is written on to the TDD of a locating unit, it will be immediately written onto the TDD's of all friendly units having a working data link. In addition, if a unit uses a fire control radar, all units having a data link connection with it may use that radar as if it were its own. The data link is assumed to be used whenever a contact is made with an active or passive sensor; at that time, if there are opposing units in the proper position, they may detect or jam the data link just as if it were a short range radio.

d. Underwater radio: As short range communication, but the communication can be detected by all units in range of the transmitter, not just by units lying between the communicating units. The communicating player must indicate to his opponent all units which are capable of detecting the transmissions.

Note: In all cases, even if a unit's communication is detected, the contents of the messages need not be revealed.

e. Note — All communication is voluntary; players are never forced to communicate between units.

8. LASER COMMUNICATION:
A new type of communication system being installed on some US ships is laser communications. The procedures for laser communications is the same as for short-range communications. Laser communications is directional, and the maximum range of such communication is limited by the visual horizon. Therefore, the maximum communications range using laser communications is equal to the maximum **daylight** visual sighting range, even at night. Laser communications cannot currently be jammed, and it may be used after conventional communications are knocked out.

XIV. TORPEDOES:

1. EFFECTIVENESS OF TORPEDOES:
Most modern torpedoes are effective only against submerged submarines, and such torpedoes may not be used against surface targets. Only torpedoes listed on the Torpedo Data Table as being anti-ship or dual purpose may be used against surface targets.

2. SEQUENCE OF PLAY:
All torpedo firing and determination of damage will occur during the Torpedo segment of each combat phase. The sequence of play for each torpedo segment will be as follows:

a. Determine damage caused by previously launched torpedoes.

b. Move all previously launched torpedoes.

c. Launch new torpedoes.

3. TORPEDO LAUNCHING:
a. During the torpedo launching portion of each torpedo segment of the combat phase, both players announce if they are considering launching torpedoes. If at least one player (or team) is considering it, the opposing players will turn their backs to the playing surface while these players measure ranges, check bearings, etc. When they have completed this, their opponents will be given a similar opportunity. Players which are considering launching are not actually committed to launch.

b. Once this is completed, the players may place one "Torpedo" counter next to each of their ships for every torpedo mount being fired. The counters must be placed face down in such a way that they touch the model of the launching ship as close to the bridge as possible. If the ship has tubes which bear only to the side, the counter must be placed near the side of the model in the direction the tubes are firing. If the tubes can only fire forward, the counter must touch the bow of the model; if the tubes can only fire to the rear, the counter must touch the stern of the model.

c. The players will then consult the Torpedo Data Table to determine how fast the torpedoes carried by each ship can move during each combat phase. They then measure that distance from the bridge of each ship out in the direction of firing. They then place one other counter face down at that point. If measurements are required, the opposing players will turn their backs to the playing area while the measurements are made.

Note: As indicated in the Movement Section, "dummy" counters may be placed by either player at any time anywhere on the playing area. Players may thus put "dummy" counters next to non-firing ships to mislead their opponents into thinking that torpedoes were launched.

d. The players will now designate secretly in writing the following information for each of their torpedo mounts:

1. The number of torpedoes fired.
2. The type of guidance and homing used.
3. The type of pattern (tight, normal, or wide).
4. The range to which the torpedoes are set.

The maximum number of torpedoes which can be fired from each mount is, of course, the actual number of torpedoes remaining in the mount, while the minimum number is one.

e. After all players have completed step (d), each team may roll one six-sided die for every opposing ship next to which at least one torpedo counter has been placed. If the number rolled is 5 or higher, the player commanding the ship must inform his opponents if that ship is actually firing torpedoes. He need not reveal the number, nor any other information. The torpedo counters must then be turned face up. Adjust the roll as follows:

1. If any opposing ship is within two miles (6") of the torpedo firing ship, add 1 to the number rolled.

2. If all opposing ships are over six miles (18") away from the torpedo firing ship, subtract 1 from the number rolled.

3. If all opposing ships are over nine (27") miles away from the torpedo firing ship, subtract 2 from the number rolled, i.e., spotting the torpedo launch is not possible.

If the torpedo firing ship is not visible to any opposing ship, do not roll the die since the torpedoes cannot be spotted. The die is rolled only during the phase the initial torpedo counter is placed on the playing surface.

f. Torpedo Firing Restrictions:

1. Torpedoes may never be fired against targets which are neither visible to the firing ship nor located by one of the firer's active sensors at the time of firing.

2. Regardless of the torpedo fire control rating, torpedoes may be fired upon targets which were initially located by the firing ship during the same combat phase.

3. Torpedoes may only be fired at elligible torpedo targets. An elligible torpedo target is any enemy ship that meets the requirements in (1) and (2) above. All those ships which do not meet the requirements in (1) and (2) are inelligible torpedo targets. When placing the initial torpedo marker, it must be placed in a direction in which there is an elligible target. The second marker must be placed in such a way that it is closer to the same elligible torpedo target than was the first counter. If this is done, these firing requirements are met. Note, however, that the actual torpedo target need never be indicated in writing and it is possible that the torpedoes may hit targets other than the elligible target mentioned above.

4. Torpedoes may not be fired during a turn in which the firing ship moves evasively or makes a normal turn of over 90° or an emergency turn of over 45°. If torpedoes are fired during the first combat phase of a turn and the firing ship performs one of these maneuvers during the second combat phase of the turn, immediately remove the torpedo counters since the ship is incapable of firing.

5. No more than two acoustic torpedoes may be fired by a ship in the same direction (forward, aft, port, or starboard) during a single phase.

4. TORPEDO MOVEMENT:

a. During each torpedo segment, all previously launched torpedoes which are still running will "move". Each player will consult the Torpedo Data Table for the speed of the torpedoes and will measure that distance outward from the last torpedo counter placed for each mount. Another counter will be placed at this point. Thus, the track of each torpedo spread will be indicated by a line of counters placed in such a way that the distance between each counter will be equal to the torpedoes speed.

b. If the torpedoes are unguided, all of its counters must be in a straight line; that is, once the second counter has been placed, the torpedoes must continue to "move" in exactly the same direction. If the torpedoes are wire guided, the direction of movement may be changed by up to 90° at the beginning of **each** torpedo move. Thus, the direction of bearing of the torpedoes may be changed by up to 90° when the third counter is put down, and by another 90° in either the same or opposite direction when the fourth counter is to be put down, etc. The torpedo does not suffer any movement penalty for turning. Of course, the player need not indicate in writing any information about turn; he will decide to make turns only immediately before "moving" the torpedoes. In all cases, however, the torpedoes new counter must be closer at the end of its move to any elligible target than the prior counter was, but the elligible target may be changed each phase, just before the movement of the torpedo, at the owning player's option. Remember that if a vessel is not visually sighted or detected by a radar, it is not an elligible target.

5. TORPEDO PATTERNS, GUIDANCE, HOMING AND RANGE:

a. Patterns: Torpedoes may be fired in tight, normal or wide patterns. Wider patterns increase the possibility of a single hit while reducing the chance of multiple hits, while tight patterns frequently produce either multiple hits or no hits at all. If only one torpedo is fired, the pattern must be tight.

b. Guidance: Torpedoes may be either non-guided or wire-guided. Only torpedoes listed on the Torpedo Data Table as having a wire guidance facility may be wire guided; all others are always non-guided. Non-guided torpedoes will travel only in a straight line after being launched, while wire-guided torpedoes may be "turned" by the owning player during each move as indicated in Rule 4.

c. Homing: Torpedoes can be either non-homing or acoustic homing. Only torpedoes with an acoustic homing facility may use acoustic homing. Of course, acoustic torpedoes are usually much more accurate than non-homing torpedoes.

As explained on the Torpedo Data Table, some dual purpose torpedoes have an acoustic homing system that can operate only against submarines. Such torpedoes must be non-homing when used against surface targets.

d. Range: The maximum distance torpedoes may travel is listed on the Torpedo Data Table. A torpedo may be set for a shorter range and will be removed from play at the end of the combat phase it reaches that range.

e. Pattern-running torpedoes: All pattern running torpedoes have acoustic homing, so no more than two of them may be launched by a vessel in one direction during a phase. In addition, if a torpedo is pattern running, there may be no more than one other pattern running torpedo within homing range (8" for ship launched torpedoes) of it. A pattern running torpedo is considered to be within 8" of another if the distance between the torpedo counters marking the center of each of the patterns is less than or equal to 8". Thus, if a ship launched torpedo begins pattern running, there may be no more than one other pattern running torpedo within 8" of its position. Should there be more than one such torpedo, two of them will be immediately destroyed and removed from the game. If the number of pattern running torpedoes within homing range of each other still exceeds two, remove another pair; continue removing pairs of torpedoes until the number of torpedoes within homing range of each other is reduced to two or less.

6. DETERMINING TORPEDO DAMAGE:

a. The steps in determining if torpedoes cause damage are as follows:

1. Determine the area of coverage of each spread of torpedoes.

2. For each vessel within the area of coverage, one at a time, determine the accuracy rate of the torpedo spread.

3. Once the accuracy rate against a ship is determined, roll one decimal die for each torpedo in the spread and consult the Torpedo Results Table to determine if any hits are scored.

4. If one or more hits are scored, consult the Torpedo Damage Tables to determine the amount of damage caused by each hit.

b. Torpedo damage is resolved during the torpedo segment of the combat phase before any torpedo movement or launching; thus, torpedoes cannot hit any targets during the phase they are launched.

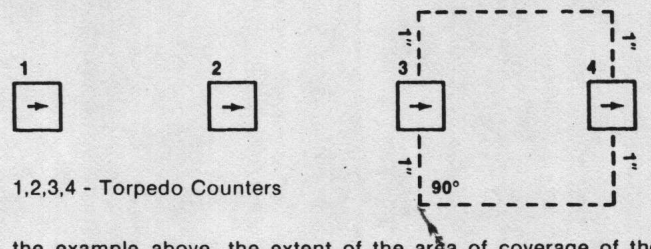
7. DETERMINING THE AREA OF COVERAGE:

a. For each spread of torpedoes, place a ruler or any other straight edge so that one end rests on the center of the last torpedo counter placed on the playing surface while the other rests on the center of the second from the last torpedo counter, thus creating a straight line between the two counters.

Example: If a torpedo has been running for three phases, place the ruler so that it forms a straight line between the second and the third counters.

b. Then, measure the distance between the last counter placed for it on the playing surface and the **initial** counter placed at the time of launch. Using this distance, consult the proper section of the Torpedo Coverage Area Table to determine the width of the area of coverage of the spread. There is one section on the Torpedo Coverage Area Table for tight patterns, one for normal patterns, and another for wide patterns. Each section has one column for a spread consisting of one to three torpedoes and another column for four to five torpedoes. Use the section pertaining to the type of pattern chosen, and the column based on the number of torpedoes fired.

c. After obtaining the width of the area of coverage of a pattern, determine if any ship of either side falls within the area of coverage. The area of coverage extends perpendicular to the torpedo track in both directions, and will begin at the last torpedo track marker placed on the playing surface and will extend only to the second from the last torpedo counter.



1,2,3,4 - Torpedo Counters

In the example above, the extent of the area of coverage of the torpedoes was determined to be 1". The area within the dotted lines is the area of coverage.

d. Pattern running torpedoes do not have an area of coverage as indicated above. Instead, starting with the combat phase following the phase in which pattern running is begun, all surface vessels within homing range of the last torpedo counter are capable of being hit by

the torpedo, just as if they were within the torpedo's area of coverage. Homing range for all surface launched pattern running torpedoes is 8". Homing range extends 360° around the last torpedo counter, so a vessel within 8" of a counter is capable of being hit by the torpedoes regardless of the relative bearing between the vessel and the counter.
(270° TUBE LAUNCHED)

8. DETERMINING IF TORPEDO HITS ARE SCORED:

a. Torpedo hit procedures for all torpedoes other than those that are pattern running:

1. If the torpedoes are not pattern running, determine which surface vessel within the torpedoes' area of coverage is closest to the point of torpedo launch. This will be the first target the torpedoes will attempt to hit during the phase. It is immaterial if the vessel is friendly or enemy; the torpedoes will always attempt to hit the target closest to the point of launch regardless of nationality. Occassionally, the target closest to the point of launch will be represented by a counter which has not yet been visually sighted or located by radar. If this is the case, the player commanding the target must indicate if the counter represents a real unit or a "dummy". If it is a real unit, the torpedoes will attempt to hit it; if it is a "dummy", remove it from play. "Dummies" can never be hit by torpedoes.

2. After determining which target the torpedoes are attempting to hit first, consult the Torpedo Accuracy Table to determine the basic accuracy rate of the spread of torpedoes. The basic accuracy rate of the torpedoes is based on the width of the area of coverage of the spread.

3. After determining the basic accuracy rate, adjust this accuracy rate as indicated in c and d below to determine the adjusted accuracy rate.

4. After determining the adjusted accuracy rate, roll one decimal die for each torpedo still running and consult the Torpedo Results Table to determine if any hits are scored. Cross-refer the number rolled with the adjusted accuracy rate. If the result is blank, no hits are scored. If the result is the number 1, the torpedo hit the target. If the result is a number in parentheses, roll the die again; if the number on the second roll equals or exceeds the number in parentheses, the torpedo hits the target.

5. If one or more hits are scored, determine damage immediately in accordance with rules 9-10 below. Reduce the number of torpedoes remaining in the spread by the number of hits scored.

6. If, after completing (5), one or more torpedoes are still running, determine which surface vessel in the area of coverage is next closest to the torpedoes' point of launch and repeat steps (2) through (5). Continue doing this until all torpedoes have hit a target, or the torpedoes have had an opportunity to hit all vessels within the area of coverage. Each torpedo receives only one opportunity to hit each vessel during each phase.

b. Torpedo hit procedures for pattern running torpedoes:

1. The order in which vessels are capable of being hit by pattern running torpedoes is based on the distance between the vessels and the last torpedo counter. The first vessel capable of being hit is the vessel closest to that counter, followed by the second closest vessel, etc.

2. The Basic Accuracy Rate for all pattern running torpedoes is always 7; accuracy is not based on the size of the area of coverage as it is with other torpedoes.

3. The Basic Accuracy Rate of pattern running torpedoes is reduced in the same manner as the Basic Accuracy Rate of straight running torpedoes, but as indicated in c and d below, not all of the adjustments apply to pattern runners.

4. Roll one decimal die for each torpedo in the pattern and consult the Torpedo Results Table as described in a (4) above.

5. If one or more hits are scored, determine damage in accordance with rules 9-10 below.

6. If at least one torpedo is still running after completing step (5), determine which vessel is the second closest to the torpedo counter and repeat steps (2) through (5). Continue doing this until all torpedoes have hit a target, or all torpedoes have had an opportunity to hit all vessels within homing range.

c. Adjustments for non-homing torpedoes:

1. If the target ship has a displacement greater than 10,000 tons, increase the accuracy rate by 3.

2. If the target has a displacement smaller than 1000 tons, decrease the accuracy rate by 3.

3. If the target is not moving, add 3 to the accuracy rate.

4. If the target's speed is between 1 and 10 kts (inclusive) add 2 to the accuracy rate.

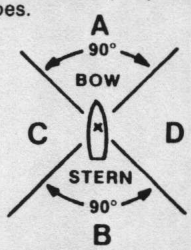
5. If the target's speed is between 11 and 20 kts, add 1 to the accuracy rate.

6. If the target's speed is between 40 and 59 kts, subtract 1 from the accuracy rate.

7. If the target's speed is between 60 and 79 kts, subtract 2 from the accuracy rate.

8. If the target's speed is 80 kts or over, subtract 3.

9. If the target is presenting its bow or stern aspect to the torpedoes, subtract 5 from the accuracy rate. The illustration below will indicate whether or not a ship is presenting its bow or stern aspect to the torpedoes.



If the second from the last torpedo counter is within the area marked "bow", the ship is presenting its bow aspect to the torpedoes; if it is within the area marked "stern", the ship is presenting its stern aspect.

10. If the launching ship was a Soviet or Warsaw Pact design, subtract 1.

d. For acoustic homing torpedoes, only the following adjustments apply:

1. As explained on the Torpedo Coverage Area Table, the area of coverage for acoustic homing torpedoes is 1" greater than the coverage area for non-homing torpedoes.

The accuracy rate for acoustic torpedoes is based on the width of the area of coverage **after** this increase. Thus, the base accuracy rate of acoustic torpedoes is always less than the accuracy rate of a similar spread of non-homing torpedoes. However, as indicated below, this base accuracy rate will be increased due to the fact that the torpedoes have acoustic homing, so in the end, the adjusted accuracy rate of acoustic torpedoes will exceed the adjusted accuracy rate of non-homing torpedoes.

2. Increase the base accuracy rate by 6 because the torpedoes have acoustic homing.

3. If a normal pattern was fired, subtract 3 from the accuracy rate. If a tight pattern was fired, subtract 6. If only one torpedo is running, there is no adjustment, and there is also no adjustment if the torpedoes are pattern running.

4. If the target is not moving, subtract 3. If it is moving at 1-10 kts, subtract 2. If it is moving at 11-20 kts, subtract 1. If the target's speed is 60-79 kts, subtract 1. If it is 80 kts or over, subtract 2.

5. If the target is presenting its bow aspect, subtract 6 if the launch of the torpedo was spotted; subtract only 2 if the target is presenting its bow aspect but the launch of the torpedo was not spotted. **Exception:** If the torpedo is pattern running, there will be no reduction in the accuracy rate due to the target presenting its bow aspect to the torpedo counter. There is never any adjustment if the target is presenting its stern aspect.

6. If the target is listed on the Ship Characteristics Table as being "quiet", subtract 2. If the target is listed as "very quiet", subtract 4. If the target is listed as "noisy", add 2. If the target is "very noisy", add 4.

7. If the target is using a "foxer" (see below), subtract 4.

8. If the launching ship was a Soviet or Warsaw Pact design, subtract 1.

9. If the target "fishtails" (see below) during its last opportunity to move before coming into the area of effect of the torpedo, subtract 2.

10. If the torpedo is pattern running and the distance between the target and the last torpedo counter is less than one-half of the homing range (i.e., less than 4" for all ship-launched torpedoes), add 3 to the accuracy rate.

e. All adjustments in the cases of both non-acoustic and acoustic torpedoes are cumulative. If after adjustment the accuracy rate exceeds 18, use 18 as the adjusted rate, if the resulting rate is less than 1, use 1.

Note: Hovercraft, hydrofoils, and surface effect ships can never be hit by torpedoes.

9. DETERMINING TORPEDO DAMAGE:
If one or more torpedo hits are scored, pick one card for each hit and consult the proper Torpedo Damage Table to determine the extent of the damage. There are three Damage Tables; one for ships under 1000 tons, one for ships of 1000-10,000 tons and one for ships of over 10,000 tons, and each table has several columns. The suit of the card will determine which column to consult, and then use the number to determine the damage.

Exceptions: 1. If a ship is hit by an acoustic torpedo always use the diamond column regardless of the actual suit of the card.

2. If the torpedo was British MK 20 or US MK 37, treat the ship as if its displacement were 1/3 greater than its actual displacement when consulting the damage table.

Example: If a 9,000 ton ship is hit by one of these torpedoes, it will sustain damage as a ship of over 10,000 tons (9,000 × 1-1/3 equal 12,000 tons).

10. DAMAGE ADJUSTMENTS:
a. Aircraft carriers, oilers and tankers: In addition to the damage sustained normally, look to the damage line given for the number that is one higher than the number picked. **Example:** If a 2 of hearts is picked, the ship will sustain the damage listed next to number 2 on the heart column, but in addition, look at the result next to number 3. If there is a fire indicated there, the ship will sustain the fire damage in addition to its other damage.

In addition, whenever a fire breaks out on a carrier (either because it was indicated on the line of the number picked or the line below it), double the level indicated.

b. Poor shock mountings: Whenever a ship listed on the Ship Characteristics Table as having poor shock mounting sustains a torpedo hit, look to the damage indicated for the number that is one higher than the number on the card picked. If that result indicates either engine damage or damage to electronics or generators, the ship will sustain that damage in addition to its normal damage. If the normal damage resulted in engine damage and the result on the line below it also indicates engine damage, the ship will sustain only the engine damage that is of the greater severity; it will not sustain the engine damage indicated on both lines.

11. RELOADING:
Reloading occurs during the combat phases of the turn. Reloading requires the weapon mount to remain unfired for a number of consecutive combat phases. Five phases are required to reload each tube of a torpedo mount. A launcher may not reload during any phase it fires even if some of the tubes are loaded. A torpedo mount can be fired before reloading is completed (provided one or more of the tubes are loaded), but if this occurs, the reloading process must begin again, i.e., five consecutive combat phases must pass before the tube is reloaded. **Example:** A ship has a triple torpedo mount containing one torpedo and two empty tubes. The player begins reloading one of the tubes during a phase, and continues reloading the tube during the next two consecutive combat phases. However, during the next phase, he fires the one remaining torpedo in the mount. In order to reload the tube previously worked on, the mount must remain unfired during the next five consecutive combat phases; the fact that three combat phases were spent in reloading the mount prior to the last time it fired has no effect. The player loses the benefit of these phases should he fire before reloading is completed.

12. "FOXERS":
Foxers are electronic devices used to decoy acoustic torpedoes away from their targets. Not all ships carry them. To use a foxer, the player must indicate which ship will use one during any combat phase. The foxer will not become operational until the following combat phase. Once operational, the foxer will reduce the accuracy of acoustic torpedoes which attempt to home in on the ship using the device as indicated earlier. A foxer will only protect the ship using it; it will have no affect on the accuracy of the torpedoes against other ships.

13. FISHTAILING:
To accomplish a "fishtail" maneuver, the ship must make a 90° or greater emergency turn during its movement phase. In order for this maneuver to be effective, it must be made either during the movement phase immediately preceding the combat phase the target comes within the area of effect of the torpedo, or if the target's opportunity to move occurred in the movement phase prior to that one, it must have been made at that time.

14. TORPEDO FIRE CONTROL:
Torpedoes may receive any necessary firing information from the main ship radars or visual spotting; there are no torpedo radars. The rating of torpedo fire control systems has no effect on accuracy.

XV. ELECTRONIC WARFARE

PART A: INTRODUCTION

1. DESCRIPTION OF ELECTRONIC WARFARE:
This section will describe the various electronic devices used to detect air and surface targets and also the electronic devices used to combat such equipment. This rule section is divided into five parts.

Part A: An introduction. This section also indicates the sequence in which the various electronic devices are to be used.

Part B: Provides rules for using radar.

Part C: Describes the use of the various passive electronic sensors.

Part D: Describes the use of electronic counter measure (ECM) equipment.

Part E: Provides rules for electronic countercountermeasures (ECCM).

2. BASIC SEQUENCE OF PLAY:
The use of electronic equipment for searching will occur during the Electronics Search segment of each combat phase. The sequence of play for each Electronics Search Segment is as follows:

a. Both players will resolve the use of passive sensors.

b. Both players will resolve the use of all radars assigned to a search function.

The use of radars assigned to a fire control function will be resolved at the time the weapons they control are fired, i.e., the use of radars used to control gunfire will be resolved during the gunfire portion of the combat phase. Radar used to control SSM's will be resolved during the SSM portion of the phase.

3. NECESSARY EQUIPMENT:
In order to conduct electronic warfare, a large number of counters must be provided to both teams. The numbers and types of counters that must be available to each team are as follows:

a. For each ship in a team's force, the team must be provided with one of each of the following counters:

1. Noise **2.** Real **3.** Radar

b. For each ship in the team's force, the team must be provided with at least two counters marked "blip".

c. For each ship in the team's force, the team must be provided with at least two unmarked, "blank" counters.

PART B: RADAR

1. FUNCTIONS OF RADAR:
Radars may be assigned to perform one of the following functions during each phase.

a. Search: Radars assigned to search will attempt to locate opposing units.

b. Fire Control: Radars assigned to fire control will provide accurate range and bearing information for one or more weapon systems on units previously spotted.

Most radars may be assigned to only one of these functions during each phase and not all radars are capable of performing both functions. The function to which a radar is assigned may be changed during each phase.

2. TYPES OF RADARS:
There are four main types of radars:

a. Air search radars: These are long-range radars designed primarily to locate aircraft flying at low altitude or higher. They are most effective against aircraft operating at very high altitude, and the effectiveness decreases as the altitude of the target decreases. They may occasionally locate surface targets or targets flying at very very low altitude, but this is unlikely. Air search radars cannot be assigned to Fire Control functions.

b. Surface search radars: These are short-range radars designed primarily to locate surface targets or targets flying at surface skimming or very low altitude. They are usually incapable of detecting targets flying at low altitude or higher, and they may not be assigned to fire control functions.

c. Fire control (FC) radars: These are short-range radars designed to provide very accurate range and bearing information on previously located targets, enabling the weapon system to engage them with high accuracy. There are two types of FC radars:

1. Main gun FC radars are used to direct the main guns and may also direct some SSM's and torpedoes. They may be used against both surface and air targets and may also be assigned to operate in a search mode.

2. Secondary FC radars may only control the firing of one weapons system and may never operate in a search mode. See Rule 5 whenever using an FC radar in a search mode.

d. Track while Scan (TWS) radar: These are surface search radars which are also capable of providing fire control information **simultaneously.** Such radars will always be assigned to a search function, but any surface target which was located during a **prior** phase may also be tracked as if by a fire control radar during the same phase that the radar is performing the search function. Only surface targets may be tracked by TWS radars. The fire control information provided by TWS radars is less accurate than that provided by FC radars, so accuracy when using TWS is usually less than when FC radars are used. When a ship sustains damage to radar systems, TWS radars are considered surface search radars.

3. BASIC RADAR SEARCH PROCEDURES:
a. As indicated in Rule 3 of Part A above, each team will be provided with a number of counters having various designations. Before resolving the use of radar detectors, the players must put a "radar" counter next to any unit that will be using radar in a search mode during that phase. This is explained in Part C below. Unless a "radar" counter is placed next to a unit at this time, it may not use radar in a search mode during the phase.

b. Resolve the use of Radar Detectors in accordance with Part C.

c. As indicated in the Preparing for Play section of this book, at the start of the game, both teams must have placed two additional counters under each of their actual and "dummy" counters. These counters must have been placed face down one on top of the other in the order listed below:

1. If the counters were placed beneath the position of an actual ship (of any type), a "blip" counter must have been placed on top. If the counters were placed beneath a "dummy" counter, a blank counter must have been placed on top.

Exception: If the team has a jammer operating in a deception mode, they may have placed "blip" counters beneath "dummies" in accordance with the rules for deception jamming given in Part D below.

2. Beneath the counter chosen in (1), another counter must have been placed. If the counter was placed beneath an actual unit, it must indicate "Real"; if the counter was placed beneath a "dummy", it must be blank, even if deception jamming is used.

Before resolving the use of searching radars during each phase, if a player is permitted to use deception jamming, he may rearrange these counters, called radar search counters, in accordance with the False Target Generation rules given in Part D. Should a player wish to do this, he may request his opponents to turn their backs to the playing surface while he does it.

d. Once this is completed, each team will resolve the use of all radars assigned to a search function. While a team is doing so, their opponents will turn their backs to the playing surface so that they should not know which of their units are detected. A player may use a ship's radar for search purposes only if he has put a "radar" counter next to the ship. If he has done so, any and all of the ship's search radars may be used at this time. To resolve the use of such radars, do as follows for each radar:

1. Determine which opposing units are using "noise" jamming. Only units with a "noise" jamming counter placed next to it may engage in noise jamming. If there is a "noise" counter next to a unit which has not yet been turned face up, it will be turned face up now before the use of any searching radar is resolved. See Part C for additional information on placing "noise" counters.

2. The player will then choose to resolve the use of his searching radars in any order one at a time. As mentioned earlier, only units having a "radar" counter next to it may use their radars in a search mode. When using a radar, first search all opposing units on the surface, then search those at surface skimming altitude, followed by progressively higher altitude levels until all units are searched.

3. The first step in resolving the use of each radar is to determine if the radar is being "noise" jammed. To do so, measure the range between the radar and all opposing units having a "noise" counter next to it. Then consult the Radar Detection Table to determine the maximum range at which the radar can detect the jammer. If the distance between the radar and the jammer is less than or equal to the maximum radar detection range given on the table, the radar is being jammed; otherwise, the jammer will have no effect on the radar. The effect of noise jamming is explained in Part D of these rules.

4. The player will then pick one card and place it next to the searching unit.

5. The player will then consult the Radar Guide to determine the Basic Strength of the radar being used at the altitude being searched.

6. For each unit being searched, the player will determine if any of the adjustments given on the Radar Adjustment Table apply to the unit being searched. If so, he will adjust the number on the card picked in (4) above as indicated by the adjustment. He will then consult the Radar Adjustment table, cross-referring the adjusted number with the Basic Strength of the radar. This will reveal the maximum range at which the unit may be detected. However, consult the Radar Detection Table and cross-refer the size or altitude of the searching unit with the size or altitude of the unit being searched. If the range given by the Radar Adjustment table is less than or equal to the range given on the Radar Detection Table, the range given by the Radar Adjustment Table is the maximum range at which the unit can be detected. If the range given by the Radar Adjustment Table is greater than the range given by the Radar Detection Table, the range on the Radar Detection Table will be maximum range at which the unit can be detected. The maximum range at which a unit can be detected can never exceed the range given on the Radar Detection Table.

7. Measure the range between the unit being searched and the searching unit. If the range is less than or equal to the maximum range at which the unit can be detected, it is detected by the radar.

8. The procedures in (6) and (7) will be followed for every unit being searched by the radar. Note that only one card is picked per searching radar each phase regardless of the number of units being searched for. The number on that one card will be used to determine the results of all attempts at searching. However, the adjustments made to the number picked will be made separately for each unit being searched, and the adjustments that apply to one unit will not necessarily apply to all units. Therefore, even though only one card is picked, the ranges at which the various units can be detected by a single radar can vary. However, if the exact same adjustments apply to more than one unit, the maximum range at which they can be detected will be exactly the same, so it will not be necessary to recompute the maximum detection range for such units.

9. If a unit is detected; the top counter beneath it will be turned face up. If it is a "blip", the unit has been located by the radar.

The identifying number written on the unit's counter can be immediately recorded in the "Visual/Radar" box on the locating unit's TDD and also on the TDD's of all units having a data link connection with the locating unit.

10. As soon as a unit is located, pick one card for the unit. If the card is of the proper suit indicated in ECM Rule 6 (c) below, the bottom counter may also be turned over, which will reveal whether or not the located unit is a false target. Note that when determining whether or not a unit is a false target, a separate card will be picked for each unit detected. Do not use the same card for more than one unit. Only one card is picked for each detected unit each phase to determine if the bottom radar search counter can be turned face up; do not pick one card per detecting radar.

11. The procedures given above will be followed for each radar in turn. Of course, it will not be necessary for a unit to search units that have already been detected by itself or by any unit connected to it by data link. After completing radar searches, all counters which were turned face up during the search procedures will be returned face down to their original position so that the opposing players will not know which units were located. At this time, also record the designation of all opposing units using "noise" jammers in the "Radar Det" box of the TDD's of all units which used radar that was subject to that jamming and all units having operating radar detectors. Such opposing units will be treated as if they were located by radar detectors. Of course, if the opposing unit was already detected by a unit's radar detector, it will not be necessary to do this.

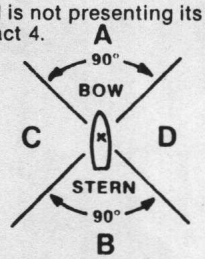
4. ADJUSTMENTS TO THE NUMBER PICKED WHEN THE RADAR ADJUSTMENT TABLE IS CONSULTED:

a. If the unit being searched is marked "small", add 4 to the number picked.

b. If the unit being searched is marked "large", subtract 4 from the number picked.

c. If the unit being searched is marked "missile", add 7 in addition to any size adjustment. That is, if the missile is small, 11 will be added (7 for missile, 4 for small), while if it is large, only 3 will be added (plus 7 for missile, minus 4 for large).

d. If the unit being searched is not presenting its bow or stern aspect to the searching unit, subtract 4.



The unit being searched is presenting its bow or stern aspect if the searching unit is anywhere within areas A or B; therefore, add 4 if the searching unit is in C or D.

e. If ECM or ECCM devices are being used, the number picked will be adjusted as indicated in Parts D and E below.

f. If the radar has an unstabilized antenna, add 2 to the number picked.

g. If the unit being searched was detected by the searching unit by visual sighting or radar during the prior combat phase, subtract 6.

All adjustments are cumulative.

5. RESTRICTIONS ON THE USE OF RADARS IN A SEARCH MODE:

a. As indicated in the Preparing for Play section of the rules, the players must indicate in writing which radars will be turned on at the start of the game. This decision cannot be changed in any way until at least one enemy unit is located by any means. Once this occurs, radars may be turned on and off and used as desired beginning with the same phase for all locating units, and the following phase for all units in communication with a locating unit. Beginning with the phase following the phase in which all contacts are lost, radars may no longer be turned on or off as desired.

b. As indicated earlier, FC radars can be used for search purposes. There are two additional restrictions that apply when using FC radars for search:

1. FC radars cannot be used to search unless at least one enemy unit has already been located by the unit carrying the radar by any method (visual sighting, radar, or passive detector).

2. FC radars may search in only one of four directions each turn, i.e., they may search either toward the bow of the unit, or its stern or one of its sides. The extent of the area that can be searched can be determined from the diagram given in Rule 4 above. A FC radar located on a unit in the center of the diagram can search for units that lie in any **one** of the areas A, B, C, or D. The actual position of the radar on the searching ship has no effect on the area it is permitted to search.

3. The area being searched by the FC radar must contain one of the opposing units already located by the unit by any means. The located unit need not be in radar detection range, but it must be somewhere within the area being searched.

4. FC radars may only detect surface targets and those at surface skimming or very low altitude level. Use the FC strength of the radar for searching.

5. After determining the maximum range at which a unit can be detected, pick a card for the unit before turning over the top counter. If the card is red, do not turn over any of the counters placed beneath the unit being searched for; that unit remains undetected. If the card is black, turn over **both** counters placed beneath the unit; the unit is detected and located and the player will automatically be aware if it is a false target. False target generation is ineffective against FC radars. Note that **one** card will be picked for **each** unit that is within detection range of the radar; do not use the same card for more than one unit.

6. EFFECTS AND DURATION OF DETECTION BY RADAR:

a. Beginning with the phase a unit is located by radar, it may be fired upon just as if it were visually sighted. The rules for the various weapon systems will explain the restrictions on firing at units located by radar.

b. As indicated in the communications rules, if a unit is detected by radar during a phase, all units in communication with the detecting unit will also be assumed to have detected the unit beginning with the subsequent communications phase of the turn. At that time, the designations of all opposing units detected by radar should be written onto the TDD's of all units in communication with the detecting units.

c. Once a units has been detected by radar, it remains detected only until the end of the electronics segment of the next combat phase. During that phase, the unit must again be detected by radar or radar contact will be lost. However, as indicated in rule 4, g above, the number picked when consulting the Radar Adjustment Table for previously detected units will be reduced, thus increasing the chance of detection. In addition, if a unit detected in a prior combat phase is again detected by a unit, all units in communication with the detecting unit at the time of detection are assumed to detect that opposing unit simultaneously. Thus, once a unit detects a previously detected unit it is not necessary to search for that unit with any unit in communication by any method with the detecting unit, since all units in communication with the detecting unit automatically detect the opposing unit at the same time. Note that in this situation, the units in communication with the detecting unit are assumed to detect the opposing unit during the electronic search segment of the combat phase, not during the subsequent communications phase as is normally the case. The communication between the detecting unit and other friendly units is subject to detection and jamming by opposing units in accordance with the radio detection and jamming rules given in Part C below.

7. RESTRICTIONS ON THE USE OF RADARS IN A FIRE CONTROL MODE:

a. Only FC and TWS radars may be used for fire control purposes, and TWS radars may be used only against surface targets.

b. The target against which the radar is being used must have already been located by the unit carrying the radar by either visual sighting or radar. Unlocated units and those located only by passive sensors cannot be tracked by radars operating in a fire control mode.

c. All Fire Control radars may be used against targets during the phase in which the target is initially located. TWS radars may not be used against targets until the phase after the targets are initially located.

d. Each FC radar may track only one type of target each phase. There are two types of targets: surface and air. If a FC radar is used to track surface targets, only one ship may be tracked by that radar during the phase. TWS radars may track any number of surface targets during a phase; they are incapable of tracking air targets.

e. Radars which were used in a search mode may be used in a fire control mode during the same phase. Guns, however, may not be fired with radar fire control if the fire control radar was used in a search mode during the same phase. TWS radars may search and be used for radar fire control for all weapons during the same phase.

8. FIRE CONTROL TRACKING PROCEDURES:
a. The use of radars assigned to fire control will be resolved just before the fire of the weapons the radar is controlling is resolved. Most fire control radars control only one weapons battery (e.g. main guns or main SAM's). When a radar is controlling the fire of more than one weapon batery, the use of radar will be resolved only once during the phase, just before the first controlled weapons is fired. The result will affect the radar for the entire phase.

b. Before resolving the use of each radar, the owning player must announce which opposing unit he is attempting to track with the radar. His opponent will then indicate if the target unit or any other unit within 3" of the target has a working radar detector. If there is such a unit, the player owning the radar must indicate to his opponent the location of the unit using the radar; this unit is immediately detected by the radar detectors of the target unit and all units within 3" of the target, and the designation of the unit using the radar may be immediately written into the Radar Det. box on the TDD's of all detecting units. As indicated in Part C below, only the target unit and units within 3" of the target are capable of detecting fire control radars.

In addition, if the target unit or any unit within 3" of the target has a working radar detector rated A, the player owning the radar must announce the name of the radar. If all such units have radar detection ratings of B, the player commanding the target unit must pick one card; if the number picked is 1 or 2, the opposing player must announce the name of the radar used, while if any other number is picked, the name of the radar is not revealed.

c. The player commanding the target unit must then announce if any ECM is being used against the radar. Only the target unit and units within 3" of the target may use ECM against radars operating in a fire control mode. In addition, these units may use ECM only if they have operating radar detectors. If ECM is used, the player must announce the type of ECM he is using.

d. After determining if ECM is being used against a radar, the player commanding the radar will determine the Basic Strength of the radar, and will pick a card. The number picked will be adjusted as indicated in Rule 4 above and then, after adjustment, the Radar Adjustment Table will be consulted, just as for searching. If the radar has not already been defeated by the ECM, measure the distance between the target unit and the unit using the radar; if the distance is less than or equal to the range indicated on the Radar Adjustment Table, the target is successfully tracked and may be fired upon with radar fire control accuracy, provided the radar is not knocked out before the weapon is fired. If the distance between the target and the radar is greater than the distance indicated on the Radar Adjustment Table or if the radar was defeated by ECM, no radar fire control will be possible with that radar. See the ECM rules for additional information.

e. If a FC or TWS radar is successfully used to track a target, the player using the radar may turn over both of the counters which were placed under the target unit's counter (if it is represented by a counter). Occassionally when doing this, a player will discover that the radar is tracking a "dummy" counter, which appeared real to the opposing player due to the successful use of deception jamming. When this occurs, the radar may not track any other target during the phase.

PART C: PASSIVE SENSORS

1. DESCRIPTION OF PASSIVE SENSORS:
Passive sensors are devices which can detect the presence of opposing units without needing to broadcast any energy. For this reason, unlike with active sensors, the use of passive sensors cannot be detected by the enemy. This section is only concerned with passive detectors which relate to surface action. The passive sensors which relate to surface actions are radar detectors and radio detectors.

2. THE REQUIREMENTS FOR USING RADAR DETECTORS:
a. Ships equipped with radar detectors will be assumed to have them operating at all times (unless, of course, they are unable to function). If a radar or radar jammer is being used, it will automatically be located by a radar detector if the following requirements are met:

1. The radar or jammer is within the detector's area of coverage.

2. The detector is capable of acquiring the radar's or jammer's signals.

b. Area of coverage: A radar detector's area of coverage extends 360° out to the effective range of the detector. Radar detectors are capable of detecting shipborne radars and noise jammers out to about three times the effective range of the radar or jamming set. For tactical purposes, all radar detectors will be assumed to have an unlimited range.

c. Radar detectors are capable of acquiring the following radar and jammer signals:

1. If the radar signals are from a search radar, they can be acquired by detectors mounted on aircraft flying at any altitude and by detectors on surface ships.

2. If the radar is a fire control radar engaging in a fire control function, it may be detected only by the unit it is tracking and by units within 3" of that unit. If the radar is engaged in a surface search function, it may be detected just like a search radar.

3. TWS radars are detected just as if they were search radars.

4. Radar jammers can only be detected if they are engaging in noise jamming; jammers engaging in deception jamming cannot be detected. Radar jammers engaged in noise jamming can be detected by ships or aircraft at any altitude.

5. Some radar detection equipment is incapable of detecting certain types of radars and jammer signals. Any such restrictions will be given on the Ship Characteristics Table.

d. Each unit will have a radar detection rating of A or B. This rating is listed on the Ship Characteristics Table. The unit's radar detection rating will affect its ability to respond to radar detection.

3. RADAR DETECTION PROCEDURE:
a. At the beginning of the radar detection portion of each electronic search segment it will be necessary to determine if both sides have at least one radar detector in the battle area. If a side does not have at least one operating radar detector, he must indicate this to his opponent at this time; otherwise, it can be assumed that both sides have at least one working radar detector.

b. As indicated in Rule 3 of Part A above, each team will be provided with a number of counters having various designations. If a player intends to use a radar in a search mode during the phase, he must place a "Radar" counter next to the unit. Players who wish to use "noise" jamming **may** also put a "noise" counter next to each unit using this device at this time, but since most units will have another opportunity to turn on their noise jammers after the use of radar detectors is resolved, this is usually not necessary. Both teams will place the counters down simultaneously face down. If a team has at least one operating radar detector, they may then turn all of the opposing counters face up; if the team does not have a radar detector, the counters will remain face down. "Blank" counters may be placed as desired next to any unit or "dummy" counter in order to mislead the opposing team.

c. Any unit with any counter placed face up next to it is considered "located" by a radar detector. Each player should write the designations of all opposing units which are located in this manner in the "Radar Det." box on the TDD's of all units which detected the opposing unit and also on the TDD's of all unit's having a data link connection with any of the detecting units. Units which are located by a radar detector may be engaged by certain weapons as indicated in the various weapons rules.

d. Both teams will now indicate if any of their units have a radar detection rating of A. If there is such a unit, the owning player may request his opponent to reveal the name of all radars being used by any or all of his units which have a "radar" counter placed next to it. If the request is made, it must be honored.

Example: If a player commands a unit with a radar detection rating of A, he may request his opponent to reveal the names of all the radars being used by each opposing unit during that phase. The opposing player must reveal the names of the radars and indicate which unit is using each.

e. If all of the units in a side's force have a radar detection rating of B, one of the players on that side will pick one card regardless of the number of units in the force. If the number picked is 1 or 2, the force has discovered the names of some of the radars being used by a number of the opposing units; if the number picked exceeds 2, the force was unable to determine the name of any radar during that phase. If the force did discover the names of some radars, the number is dependent on the suit of the card and the number of units in the detecting force:

1. If the card is a spade, the force detects the names of the radars being used on a number of opposing ships equal to the number of units in the detecting force. **Example:** If a force of five units picks a one or two of spades, it will discover the names of the radars being used on five opposing units during that phase.

2. If the card is a club, the force detects the names of the radars being used on a number of opposing units equal to 1/2 of the number of units in the detecting force (round upward if necessary).

3. If the card is a diamond, the force detects the names of the radars being used on a number of opposing units equal to the 1/4 of the number of units in the detecting force.

4. If the card is a heart, the force detects the names of the radars being used on a number of opposing units equal to 1/10 of the number of units in the detecting force.

If the names of radars are discovered, the detecting player will indicate to his opponent the units whose radars he wishes revealed. Of course, the maximum number of units that can be indicated is as listed above, and all of the units must have a "radar" counter next to it. The opposing player must reveal the names of all of the radars being used by the designated units.

f. When radar detection has been resolved, do not remove the counters placed next to the units, other than the blanks. At this time, any unit which detected an opposing radar during that phase, and all units having a data link connection with that unit, may begin noise jamming. If the player wishes to do this, he must place a "noise" counter next to such units. These units are immediately detected by all opposing radar detectors, so their designations may be written onto the TDD's of all detecting units.

g. All "Radar" and "Noise" counters will remain on the playing surface until the end of the electronic search segment of the combat phase, at which time all will be removed.

4. RADAR DETECTORS AND FIRE CONTROL:
a. As indicated in Part B, just before firing a weapon battery, the players may assign radars to operate in a fire control mode by announcing the target he wishes to track. If that unit, or any unit within 3" of it, has a radar detector, the location of the radar must be revealed. If any of these units have a radar detection rating of A, the name of the radar must also be revealed; if all of the units have a radar detection rating of B, roll a decimal die and the name of the radar will be revealed only if a 1 or 2 is rolled.

b. When this is completed, the players will indicate what ECM devices or techniques will be used by the target unit and any unit within 3" of it, provided each of them has a working radar detector. If a unit does not have a radar detector, it may not use ECM.

5. EFFECTS OF DETECTION BY RADAR DETECTORS:
Units detected by these devices may be fired upon in accordance with the normal firing rules, and in addition, ECM devices may be used against such units. However, bear in mind that most weapons (e.g. guns) may not be fired upon units which are located only by radar detectors and, in addition, many weapons may not be fired upon units during the phase in which they are initially located.

6. DURATION OF RADAR DETECTION:
a. A unit located by radar detection will remain located only as long as it continues using a radar or noise jammer. If during a phase, after radar detection is resolved, a unit which has been previously detected by a radar detector is no longer detected, the unit is no longer detected and it must be erased from all TDD's at the end of the phase.

b. Optional rule: In actual fact, action may still be taken against units located by radar detectors for several minutes after contact is broken. For those players who do not mind performing some additional bookkeeping, we suggest that units located by radar detectors should remain detected until three full turns (six combat phases) after they cease using radar and/or jammers.

7. RADIO DETECTORS:
a. Radio transmissions may be detected only:

1. When a unit is communicating with another unit (or its base) and the distance between those units is greater than the radar horizon.

2. When a unit is communicating with another unit, regardless of range, if the detecting unit lies between the transmitting unit and the receiving unit.

Unless either of these conditions are met, radio transmissions may not be detected. If either is met, the detecting unit can detect any radio or data link transmissions which occur between those units provided the detecting unit's communications have not been knocked out. Unlike radar detectors, which are separate from radar sets, radio detection equipment is part of its communication system and all ships and aircraft have it.

b. If the requirements in (a) are met, the transmitting unit will be located whenever it uses radio or data link. A unit is never required to use radio or data link, but if it does not do so, it is restricted in the same manner as ships which have had their communications and data link knocked out (see Damage Rule 1, (e) and (f)). If the unit uses its radio or data link, immediately write its designation in the "Radio Detect" box on the detecting unit's TDD. It may also be written in on the TDD's of all units having a data link connection with that unit. Units detected in this manner will remain detected until the phase in which the requirements for detection are no longer met; or the unit stops using radio or data link.

c. Units which are located by radio detectors may be fired upon just as if they were located by a radar detector.

PART D: ELECTRONIC COUNTERMEASURES (ECM):

1. INTRODUCTION:
Electronic Countermeasures (ECM) are devices designed to deny the enemy the use of his radars and communications equipment. Most ECM is designed to be used against radar, and most are effective against both search and fire control radars. The ECM that is effective against radar may be used at the following times:

1. During the electronic search segment of each combat phase.

2. During the combat portion of the combat phases when the use of fire control radars is resolved.

ECM that is effective against communications can be used whenever a unit attempts to communicate with another. Any exceptions to the above rules will be noted below.

2. TYPES OF ECM EQUIPMENT:
a. **Radar jammers:** These are items of electronic equipment which are found on most ships. The Ship Characteristic Table will indicate which ships do not have such equipment. Radar jammers can usually operate in both the noise jamming and the deception jamming modes.

b. **Radio jammers:** Such devices are carried on all ships and are considered part of the communication system. They operate only against opposing communications systems and data links, never against radar.

c. **Chaff:** Chaff consists of aluminum strips cut to half the wavelength of the opposing radar. It is fired from cannons or chaff launchers and reflects radar waves back to the transmitting source.

d. **Reflectors:** Reflectors increase the amount of radar waves reflected back to the radar receiver, thus making small targets appear much larger.

e. **Decoys:** These devices are launched from specially designed launchers and are equipped with electronic radar jammers or reflectors.

3. RESTRICTIONS ON THE USE OF RADAR JAMMERS:
a. As indicated in the Preparing for Play section of the rules, before the game begins both players must indicate the jammers being used, the mode of operation and the turns during which the devices will be used. Once this decision is made, the jammers may not be turned off, or have their modes changed until at least one enemy unit is located by visual sighting or an active or passive sensor. As soon as a unit is located all the jammers may be used as desired as long as at least one enemy unit remains located — See the Preparing for Play rules. If a unit is not in communication with the unit that has already located an enemy unit, no change may be made in that unit's use of jammers until the phase in which the unit becomes aware that enemy contact was made.

b. A radar jammer is not capable of jamming all radars:

1. Jammers mounted on ships or aircraft flying at very low altitude or below may jam both air search and surface search (including TWS) radars.

2. Jammers mounted on aircraft flying at low altitude or above may jam air search radars, but not surface search radars.

3. Fire control radars being used in a surface search mode can be jammed just as a surface search radar. Fire control radars used in a fire control mode can only be jammed by the target it is tracking and by units within 3" of the target.

c. Radar jammers can jam all radars within a 360° angle out to the Radar Detection Range.

d. All radar jammers are capable of operating in two modes: noise jamming and deception jamming. However, no radar jammer is capable of operating in both modes simultaneously. Therefore, the following restrictions apply:

1. If a jammer is used during the electronic search segment of a combat phase, it may be used in either a noise jamming or deception jamming mode against all radars; it may not be used in both modes during any electronic search segment.

2. If a jammer is used during a combat phase to jam radars operating in a fire control mode, it may be used in either the noise jamming or deception jamming mode (but not both) against each radar; however, it is not required to operate in the same mode against all radars. Thus, the jammer may use the noise jamming mode against one fire control radar and the deception jamming mode against another.

3. A jammer may be used against searching radars during the electronic search segment of the phase and also against fire control radars during the combat portion of the same phase. A jammer may operate in one mode during the electronic search segment of the phase and another mode during the combat portion of the same phase; a jammer which was used during the electronic search portion of the phase is not required to operate in the same mode during the combat portion of the phase.

4. NOISE JAMMING PROCEDURES:

a. Noise jamming will affect the results of radar searches and the use of radars for fire control purposes by reducing the effective range of the radar. To use noise jamming against radars operating in a search mode, the requirements in 3 above must be met, and the player must place a "noise" counter next to the unit using the radar jammer when resolving the use of radars and radar detectors. Parts B and C of this section indicates the points at which these counters must be placed.

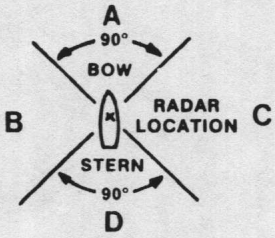
b. Noise jamming may also be used during the combat portion of the combat phase when the use of fire control radars is resolved. In order to do this, the following requirements must be met in addition to the requirements in 3:

1. The unit using the jammer must be the target the radar is attempting to track, or it must be a unit within 3" of the target.

2. The jamming unit must have detected the FC radar with its radar detector (as explained in Rule C, 4).

3. The jamming player must announce that he is using noise jamming and designate the jamming unit just before the use of the fire control radar is resolved; it is not necessary to place a "noise" counter next to the unit.

c. If noise jamming is used against searching radar, the searching player must determine which of his radars are being jammed. This is done in accordance with Part B, rule 3, d(3). If a radar is being noise jammed, the searching player must determine the area of jamming before resolving the use of the jammed radar against any target. The area of jamming is the area in which the jamming is effective; all units belonging to the jamming force that are within the area of jamming will be protected by the jamming as if they, themselves, were noise jamming. Noise jamming only protects the units of the jamming force; opposing units are not protected. The area of jamming is as follows:



If a jammer is located in area A, all units of the jamming force that are in area A are protected (i.e., they are in the area of jamming). If the jammer is in area B, all units of the jamming force that are in area B are protected; if the jammer is in area C, all units of the jamming force that are in area C are protected, while if the jammer is in D, all units of the jamming force that are in area D are protected.

This area of jamming will apply only if the player using the radar chooses not to reduce gain. Reducing gain is an ECCM technique which will greatly reduce the area of jamming. It is explained in Part E below.

If noise jamming is used against a radar operating in a fire control mode, only the target is protected.

c. If a unit is protected by noise jamming, the number picked when consulting the Radar Adjustment Table will be adjusted. Normally, the number picked will be increased by 12 against search and TWS radars and by 10 if the radar is a FC radar. The following adjustments apply:

1. Subtract 2 from the above if the jamming unit has a radar detection rating of B. Before the use of radars is resolved, the players must inform their opponents of the jamming unit's radar detection ratings.

2. If a FC radar is being used for any purpose other than gunfire or SSM launching during that phase, ignore all noise jamming adjustments. Noise jamming is ineffective against FC radars being used for any other purpose other than gunfire or SSM launching.

3. As indicated in the ECCM rules, subtract 4 if the radar has frequency agility, and completely ignore all noise jamming effects if the radar is continuous wave. This term will be explained further in the ECCM rules.

d. If a unit is protected by more than one noise jammer, there will be no further adjustments; i.e., using more than one noise jammer will not further decrease the effectiveness of the radar.

5. DECEPTION JAMMING:

a. Most shipborne and airborne jammers may operate in a deception mode in addition to a noise jamming mode. When a jammer is operating in a deception mode, it can perform two functions:

1. False target generation - creating "blips" on opposing radar screens where no unit exists.

2. Range or velocity gate pull-off - "moving" an opposing tracking radar off its target.

False target generation is useful only against radars operating in a search mode, while range or velocity gate pull-off is effective only against radars operating in a fire control mode. A jammer may perform both techniques during the same phase.

b. Requirements for using deception jamming:

1. The jammer must be located on a unit that detected opposing radars with a radar detector during the same phase. No unit that did not actually detect any opposing radar during the phase with its own radar detector may use deception jamming, not even if it has data link contact with a unit that did actually detect radars.

2. If the jammer is used for noise jamming during an electronic search segment, it may not be used for false target generation during the same electronic search segment.

3. If the jammer is used for noise jamming against a radar operating in a fire control mode, the jammer may not be used for range or velocity gate pull-off against the same radar during that phase.

4. Jammers used for noise jamming during the electronic search segment of the phase may be used for range or velocity gate pull-off during the same phase against radars operating in a fire control mode. Also, the jammer may be used for noise jamming against one radar operating in a fire control mode and for range or velocity gate pull-off against other radars operating in a fire control mode during the same phase. However, a jammer may not be used simultaneously for both noise jamming and range of velocity gate pull-off against the same fire control radar (per (3) above).

6. DECEPTION JAMMING - FALSE TARGET GENERATION:

a. If a player wishes to operate a jammer to generate false targets, he may do so during the portion of the electronic warfare phase in which the use of searching radars is resolved. A player may not use a jammer to generate false targets if the jammer is operating as a noise jammer at that time.

b. As indicated in Part B, before resolving radar searches the players must have placed two counters face down beneath each of their units and "dummy" counters. The top counter will indicate "blip" or be blank. Normally, blank counters must be placed beneath "dummies". However, if a player is using a deception jammer, he may place "blip" counters beneath up to four "dummy" counters for each deception jammer being used. The "dummy" counters chosen for this may be anywhere on the playing surface.

c. The existence of false targets can be detected by an opposing radar if the card picked after detecting the unit (in accordance with Part B, rule 3,d (10)) is of the proper suit. If the radar is a search or TWS radar, the player owning the radar will be allowed to look at the bottom radar search counter placed beneath the detected unit if the card is a spade; if the radar is an FC radar, the player may look at the bottom radar search counter regardless of the suit. By looking at the bottom radar search counter, which will either indicate "real" or be blank, the searching player can determine if the unit is a false target.

As explained in the ECCM section, the chance of detecting false targets may be increased or decreased depending on the devices included in the detecting radar. Of course, if a player detects a false target, he need not inform his opponent.

7. DECEPTION JAMMING - RANGE OR VELOCITY GATE PULL-OFF:
a. This technique may be used by the target or units within 3" of the target to defeat an opposing radar operating in a fire control mode. It may be accomplished only if the jamming unit detected the use of that radar against the target; if the radar was not detected, the unit may not use range or velocity gate pull-off even if it used deception jamming to create false targets during the same phase.

b. If a player uses range or velocity gate pull-off against an opposing radar, he will merely announce the fact. His opponent will then pick a card. If the card is of the proper suit, the jamming has succeeded and the fire control radar will be unable to track the target during that phase regardless of the range. Normally, the suits necessary for the success of jamming will be either spade or club in the case of fire control radars, or spade, club, or diamond in the case of TWS radars. However, for some radars, the required suits may be different. This is explained in ECCM Rule 7. If the jamming is unsuccessful the opposing player will consult the Radar Adjustment Table using the number on the card picked to determine the maximum range at which the target can be tracked.

c. Restrictions on range gate pull-off:

1. No more than one jammer may attempt range or velocity gate pull-off against a single radar during the same phase.

8. CHAFF - INTRODUCTION:
Chaff consists of aluminum strips cut to half the wave length of a particular radar band. Radar waves striking the chaff will be reflected back to the transmitter and will appear on the radar screen. Chaff is designed to produce clutter on the opposing radar screen and produces much the same effect as a "noise" jammer.

9. REQUIREMENTS FOR USING CHAFF:
a. Chaff can be dispensed by guns of all size, by specially designed chaff launchers, by chaff dispensers found on aircraft, and by chaff rockets found on aircraft. The use of aircraft chaff dispensers and rockets will be found in the Aircraft section of the rules.

b. Until at least one enemy unit is located by any method, no unit may launch chaff. Once an enemy unit is located, chaff may be launched as desired as long as contact is retained with at least one enemy unit.

c. All gun mounts and chaff launchers may fire chaff only **once** each phase, and any of these weapons which fired chaff during a phase may not shoot again at any time during the phase. Conversely, any gun or launcher that already fired during a phase may not also launch chaff during the same phase.

10. CHAFF LAUNCHING PROCEDURES:
a. Chaff may be launched:

1. At the beginning of an electronics search segment before the use of radar detectors is resolved.

2. After the use of radar detectors is resolved but before radar search is resolved **only** if the launching unit has an operating radar detector and it detected an opposing radar during the phase, or it has a data link connection with the detecting unit.

3. Just before the use of radars assigned to a fire control function is resolved, provided the opposing fire control radar was detected by a radar detector on the unit launching the chaff or on a unit connected to the launching unit by data link.

Note: Even though a unit may be allowed to fire chaff at several points during a phase, each gun and chaff launcher may fire only once during a phase.

b. Short range chaff launchers may launch chaff out to a maximum range of 1", long range chaff launchers have a maximum range of 18". If the chaff is fired from a gun rather than a launcher, the maximum range is equal to 75% of the maximum range of the gun against surface targets.

c. Regardless of the launcher used, the maximum range to which chaff may be launched cannot exceed 1" if the launching occurs at any point during the combat phase other than at the beginning of the electronic search segment before the use of radar detectors is resolved (i.e., in accordance with a(1) above). This is the only point during the phase in which chaff can be launched to ranges exceeding 1".

d. Place a chaff counter face up at the point to which the chaff is launched. Also, record the number of the phase in which the launching occurred on a piece of paper.

11. EFFECTS OF CHAFF:
a. Chaff will become effective as soon as it is launched.

b. In order to be protected by chaff, a unit must be within 1" of a chaff marker and at the proper altitude. If the chaff is launched from the surface, surface skimming or very low altitude, it can protect units that are at any of these altitudes. If the chaff is launched from low, medium, high, or very high altitude, it will protect only those units that are at the altitude of launch.

c. Chaff will affect only opposing radars, never any friendly radars.

d. When a radar is used against units protected by chaff, its effectiveness will be reduced as follows:

1. All radars assigned to a search mode - lose 25%.

2. Fire control radars assigned to a fire control function - lose 50%.

3. TWS radars assigned to fire control - lose 75%.

4. If the unit is within 1" of more than one chaff marker - the additional chaff markers have no effect.

Note: The reduction in effectiveness may be adjusted if the radar has the proper ECCM equipment. The ECCM rules will indicate any adjustments to be made.

e. Effects of the reduction in radar effectiveness:

1. If the radar's effectiveness is reduced by 25%, the radar will be unable to detect or track the protected unit if the number picked, before adjustment, when consulting the Radar Adjustment Table is a multiple of 4 (e.g. 4 or 8).

2. If the radar's effectiveness is reduced by 50%, the radar will be unable to detect or track the protected unit if the number is a multiple of 2 (e.g. 2, 4, 6, 8 or 10).

3. If the radar's effectiveness is reduced by 75%, the radar will be unable to detect or track **unless** the number is a multiple of 4. (E.g. the radar will be effective only if the number used is 4 or 8.)

4. If the radar's effectiveness is reduced by 100% or more, it will be unable to detect or track the protected unit.

12. DURATION OF CHAFF:
Once a chaff counter is placed on the playing surface, it will remain at that location until the chaff disperses, chaff will not move. The chaff will disperse at the end of the tenth combat phase that it is effective. As soon as chaff disperses, it will no longer offer any protection.

13. RELOADING CHAFF LAUNCHERS:
The specially-designed chaff launchers may launch only one chaff pattern (one counter) before reloading is required.

Exception: The "Philax" chaff launcher may fire four times before reloading.

Reloading any chaff launcher requires one full combat phase during which the launcher may not fire. Once the launcher is reloaded, it may again be fired.

14. REFLECTORS:
a. Reflectors are devices that can be mounted on small ships, helicopters or on decoys (see below). Both players must decide before the game which of their units are equipped with reflectors and the size of each reflector. Reflectors can be small, medium or large. If a unit is equipped with a reflector the type of counter used to represent the unit (small, medium, or large) will be the same as the size of the reflector regardless of the actual size of the unit.

Example: If a ship of under 1000 tons is equipped with a large reflector, a large size counter will represent the ship.

b. An electronic device, called a blip enhancer, is mounted on a large number of ships. These devices electronically produce a larger radar echo. The effect of blip enhancers is the same as that of reflectors, however, blip enhancers can be turned on and off. A player commanding ships carrying a blip enhancer may turn it on or off at the same time any other of the unit's ECM devices are turned on or off. If a player turns on the device, he must replace the unit's counter with a counter showing a larger size. Once turned on, the device may not be turned off until the start of the unit's next opportunity to use ECM.

15. RADIO AND DATA LINK JAMMING:
a. Opposing radio and/or data link transmissions can be jammed if:

1. The jamming unit is closer to both the transmitting and receiving units than they are to each other, or the jamming unit is closer to the receiving unit than the transmitting unit is and the distance between the transmitting and receiving units exceeds the radar horizon.

2. The jamming unit's communication system is operational.

b. If all of the requirements in (a) are met, radio and data link transmissions may be jammed at any time the jamming player desires. He will inform his opponent when jamming occurs. If radio or data link transmissions are jammed, roll one decimal die. If the number rolled is 3 or less, the communication gets through the jamming; if the number exceeds 3, the transmissions are successfully jammed and do not get through to the receiving unit during that phase.

c. Units which engage in radio and/or data link jamming during a phase may also engage in radio and/or data link communication at the same time. A unit may jam both radio and data link transmissions during the same phase, but each unit may jam only one unit during each phase.

16. INFRA-RED JAMMING:
a. Some missiles have an infra-red homing system that allow them to home in on the heat given off by opposing ships. Infra-red homing missiles may be jammed by flares.

b. Flares may be launched from any gun equipped with starshell and any of the chaff launchers, provided flares are loaded into the tubes rather than chaff rockets. If a player wishes to load the chaff launcher with flares, he must indicate this in writing either at the beginning of the game or when the launcher is reloaded.

c. Flares will be launched in the same manner as chaff rounds. Place a "Flare" counter at the point to which they are launched, just as a "Chaff" counter is placed at the point to which chaff is launched. All restrictions that apply to launching chaff also applies to launching flares.

d. Flares are used to defeat IR homing missiles as indicated in the SSM rules.

e. Flares will remain effective only until the end of the combat phase following the phase of launch, if the flares were fired from a chaff launcher; if the flare was fired from a gun, it will become effective during the phase of launch and will remain effective for one full turn (two phases). All flares will also act as normal starshells if fired at night, but if launched from a chaff dispenser they will illuminate any unit within 7" of the flare marker.

17. DECOYS:
a. The players must decide before the start of the game whether decoys will be available. At this time, U.S. ships do not have decoys, and it appears that no ships of any nation currently has decoys. Decoys can be made that can either be tossed over the sides of ships, dropped from helicopters or fired from chaff launchers, and they may be equipped with reflectors of any size, or noise jammers.

b. Requirements for using decoys: Decoys can be launched or dropped only during the electronics search segment. The requirements for launching decoys is the same as for chaff.

c. Launching procedure: When a player launches or drops a decoy, he may place a "dummy" (not blank) counter of **small** size at the point of launch. If the decoys are dropped over the side, no more then one decoy may be dropped per phase, and it must be placed off the stern of the ship (or helicopter) and within 1" of the bridge. If decoys are fired from chaff launchers, each launcher may fire only one decoy in a phase. Chaff launchers can fire decoys to anywhere within 9" of the launching ship. Ship-launched decoys may never move. If a decoy is launched from a launcher, the launcher must be reloaded; all tubes of a chaff launcher must be fired in order to create one decoy counter. Towed decoys are also available which are dropped off the stern of a ship and remain within 1" of the ship's position as long as desired.

d. Effects of decoys: The counter representing the decoy will be treated as any other "dummy" counter with the following exceptions:

1. The owning player may have a noise jammer built into the decoy. To simulate this, when resolving the use of radar detectors and radars, a "noise" counter may be placed next to it. If a player chooses to do this, he must use the "noise" counter during every phase; the decoy cannot turn its jammer on and off at will.

2. When conducting radar searches, a "blip" counter will always be placed beneath the decoy; never use a blank.

3. The bottom radar search counter in the stack placed beneath the decoy must always indicate "real".

Obviously, decoys will always appear as warships to units detecting them solely with radar or radar detectors. Decoys can only be discovered by visual sighting. They will be visually sighted only when an opposing unit comes within 1" of the decoy's location.

e. Decoys will remain effective for the entire game, or until an opposing unit ends its move within 1" of the decoy. When this occurs, the opposing player may immediately remove the decoy from play.

PART E: ELECTRONIC COUNTER-COUNTERMEASURES (ECCM)

1. INTRODUCTION:
Electronic counter-countermeasures are devices and techniques used to reduce the effect of opposing ECM. They are automatically used if any ECM is encountered.

2. METHODS OF OPERATION OF RADAR:
The method of operation of the radar being jammed can modify the effects of jamming and increase the chance of success. The method of operation of each radar is given in the Radar Guide. The possible methods of operation are as follows:

a. Pulse - This is the method of operation of practically all search radars.

b. Conical scan, continuous wave, pulse doppler or monopulse - These are various methods of operations of fire control radars.

The method of operation of the radar will automatically affect the outcome of the use of the radars as indicated below.

3. THE EFFECTS OF THE RADAR'S METHOD OF OPERATION:
a. Pulsed radars - No adjustments to the normal rules.

b. All fire control radars - If a fire control radar of any type is used to launch torpedoes or semi-active homing SSM's or if the radar is on an active homing SSM that has **already** acquired a target, noise jamming will be completely ineffective. However, if the fire control radar is being used to direct gunfire, or to launch SAM's or SSM's, or if it is on an SSM which is **attempting** to acquire a target, the fact that the radar is a fire control radar has no effect, i.e., noise jamming will be effective in the normal manner unless the radar is equipped with one of the devices described below that reduces the effect of noise jamming. If a fire control radar is used in a situation not described above, assume that the fact that the radar is a fire control radar has no effect.

Note: The rules given above apply to all fire control radars regardless of their method of operation. The actual method of operation of each fire control radar will also affect its performance as described below.

c. Conical scan radars - No further adjustments to the normal rules.

d. Continuous wave radars - Reduce the number picked when consulting the Radar Adjustment Table by 1 in all cases. Noise jamming is completely ineffective against continuous wave radars, so no adjustments will be made to its effectiveness or to the number picked when the Radar Adjustment Table is consulted. When chaff is used against CW radars, subtract 25% from the reduction in the effectiveness of the radar.

e. Pulse doppler radars - Whenever pulse doppler radars are used, reduce the number picked when consulting the Radar Adjustment Table by 1. When pulse doppler radars are used against units protected by chaff, decrease the reduction in the effectiveness of the radar by 25%.

Example: If chaff would reduce the effectiveness of a normal radar by 25%, there is no reduction if the radar is pulse doppler, if the reduction in effectiveness would normally be 50%, the reduction would be only 25% for pulse doppler radars, etc.

f. Monopulse radars - Whenever monopulse radars are used, reduce the number picked by 1 when consulting the Radar Adjustment Table. In addition, range and velocity gate pull-off will be ineffective against monopulse radars unless one of the following situations apply:

1. There are two units within 3" of the target, one of which may be the target itself, that are using range or velocity gate pull-off.

2. The target unit is an aircraft at surface skimming or very low altitude and is using a deception jammer. Only the target unit may jam in this manner.

3. The jamming unit is equipped with "**cross eye**" and is using a deception jammer. "Cross eye" is jamming equipment designed to jam only monopulse radars, and it can be installed on ships or heavy bombers only.

If any of these situations apply, range or velocity gate pull-off can be used, but it will succeed only if the card picked when consulting the Radar Adjustment Table is a spade.

4. FREQUENCY AGILITY:
Whenever a radar with frequency agility is used, subtract 1 from the number picked when consulting the Radar Adjustment Table. When such a radar is used against units protected by noise jamming, subtract an additional 4.

5. REDUCING GAIN:
a. When a noise jammer is being used, the opposing player may reduce the size of the area of jamming by reducing gain. He may choose to do this just before resolving the use of his radar. If he chooses to do so, the area of jamming is reduced to a straight line beginning at the point where the radar is located and extending through the point occupied by the jamming unit on to the limit of the range at which the radar can detect targets. Only the jamming unit and other units along that straight line can be protected by the jamming.

In return for this advantage, add 4 to the number picked when using the radar against all targets, both protected and unprotected.

A player may choose to reduce gain or not during each phase as desired.

6. MOVING TARGET INDICATOR (MTI):
Many radars are equipped with MTI, a device designed to filter out clutter. Whenever such radars are used, always subtract 1 from the roll when consulting the Radar Adjustment Table. Also, when such radars are used against units protected by chaff, the reduction in radar effectiveness will be decreased by 25%, just as if the radar were a pulse doppler. If a radar has both frequency agility and MTI, the owning player may receive the bonus accruing to only one of these devices at a time; no radar may receive the bonuses for both frequency agility and MTI at the same time. The owning player must choose which ECCM device will be used just before resolving the use of the radar.

7. JITTERED PRF:
If a radar is equipped with jittered PRF, it may detect false targets (see Rules B 3, d (10) and D, 6, c above) if the card picked is a club or spade regardless of the type of radar. In addition, when range or velocity gate pull-off is used against such a radar, it will succeed only if the card picked is a spade and the radar is an FC radar, or a spade or club if the radar is TWS.

SURFACE TO SURFACE MISSILES (SSM'S)

1. INTRODUCTION:
Surface to surface missiles are guided missiles launched from ships, designed to produce heavy damage on opposing vessels. They are highly accurate weapons, carrying very large warheads, and are capable of knocking ships out of action, if not actually sinking them. SSM's are currently the primary weapon in ship vs ship engagements. SSM's may only be fired against surface ships and other surface targets; they are not capable of hitting any other type of target.

2. BASIC SSM PROCEDURES:
a. A target must first be located by visual sighting or by an active or passive sensor.

b. After this occurs, the missiles may be launched.

c. After launch, the missiles will move toward a point where they can intercept the target. Missiles intercept a target when they move into the position occupied by the target.

d. If the missile intercepts the target, the players must determine if the missile actually hits the target. The target vessel, and other units as mentioned below, may attempt to prevent the missile from hitting its target by shooting it down or by using ECM in order to draw the missile away from its victim.

e. If one or more missiles hit the target, the amount of damage caused by the hit must then be determined.

f. Missile launch and movement, and the determination of accuracy and the damage caused by each hit will occur during the SSM segment of each combat phase.

3. SSM SEQUENCE OF PLAY:
During each SSM segment, the following sequence of play will be followed:

a. Determine any damage caused by previously launched missiles.

b. Move all previously launched missiles that are still flying.

c. Launch new missiles.

4. REQUIREMENTS FOR LAUNCHING SSM'S:
In order to launch SSM's, the following requirements must be met:

a. An opposing ship must be detected by the firing ship, by either visual spotting or radar. A ship may never fire most SSM's against any opposing ship that has been located only by a radar detector, radio detector or because the opposing ship used a noise jammer which was detected by a friendly radar.

Exception: Harpoon SS-N-2, SS-N-7, SS-N-9 and SS-N-11 SSM's may be fired against ships located by any method, including radar detectors and similar devices.

Remember that, according to the Communications rules, if a unit detects an opposing unit during a combat phase, all units in communication with the detecting unit during the subsequent Communications Phase are also considered to have detected the opposing unit beginning with that Communications Phase. Detecting a unit in this manner is sufficient to allow SSM firing. Note also that if the detecting unit has data link, all units connected to that unit by data link are considered to have detected the opposing unit simultaneously, and may fire SSM's at that target during the same combat phase.

b. The missiles may be fired during the phase the target is initially detected.

c. The target must be tracked by the proper method at the time of firing. Some missiles require target information to be received by a special SSM FC radar; such missiles may not be fired unless the target is tracked by that radar at the time of firing. Other SSM's can receive target information from any main gun FC radar, any TWS radar, and the main gun director. If the target is tracked by the main gun FC radar or a TWS radar, or if it is tracked by the main gun director, the missiles may be fired. A target is tracked by a gun director if the director is trained on the target and the target is within visual sighting range of the director; however, a gun director is incapable of tracking a target during the phase the ship mounting the director initially detects the target. Similarly, TWS radars are incapable of tracking targets during the phase of initial detection as indicated in the Radar rules. The SSM Data Table indicates the method of tracking required by each SSM.

Exceptions: Harpoons, SS-N-2, SS-N-7, SS-N-9 and SS-N-11 may be fired against target ships which are not being tracked. Also, missiles having mid-course guidance capability may be launched without the target being tracked, but the target must be tracked by the proper radar at some point before these missiles can begin homing.

5. SSM LAUNCHING PROCEDURE:
a. During the SSM segment of any combat phase, both players will indicate if they are contemplating firing SSM's. If at least one player (or team) indicates that they are, the opposing players will turn their backs to the playing area while the players measure ranges, check bearings etc. When they have completed their measurements, their opponents will be given an opportunity to do likewise.

b. If a player decides to fire SSM's, he must first resolve the use of the radar assigned to provide an FC function for the SSM. Of course, if the missile is being fired visually or without target tracking, this is not necessary.

c. When this is completed, the players will place a proper **numbered** missile counter face up next to the launching unit. The counter must indicate the size of the missile (small, medium, or large). The counter must be touching the model or counter of the firing ship and must be as close to the bridge as possible. It must also be placed in the direction of firing. Bow mounted SSM mounts may only fire directly forward or up to an angle of 90° from that direction; stern SSM mounts can fire only directly to the rear or up to an angle of 90° from that direction. SSM mounts on the side may fire only either perpendicular to the side of the ship on which they are located or up to an angle of 90° from that

direction. If the mounts are capable of swivelling, they may fire in all directions.

One counter may be used to represent any number of missiles provided all of the missiles are fired in the same direction by the same vessel. When this is done, it is likely that the missiles will home in on the same target. A player is not required to use only one counter to represent all of the SSM's fired in one direction; he may, if he desires, use one to represent each individual missile. In this way, the missiles can be fired out at slightly different headings and each may home in on different targets.

d. The players then consult the SSM Data Table to determine the speed of the missiles being launched. They will measure that distance from the bridge of each firing ship out in the direction of firing, and place another numbered missile counter bearing the **same** number face up at that point. This counter must be closer to any eligible target (i.e., any ship meeting all of the requirements given in Rule 4 above) than the initial counter.

e. The players will then indicate secretly in writing the following information on each firing ship's TDD.

1. The number and type of missiles being represented by each missile counter.

2. If the missiles are active homing, the player must indicate the following:

   a. The point at which the missile's homer will be turned on.

   b. The smallest target the missile will home in on.

   c. The methods of homing (radar, infra-red, anti-radiation, or jamming) used by the missiles.

   d. The size of the missile's search area.

   See rule 7 below for additional information.

3. If the missiles are semi-active homing, the player must merely indicate the name or designation of the target.

6. SEMI-ACTIVE HOMING - DESCRIPTION AND RESTRICTIONS:
There are two basic types of homing; semi-active and active. If a missile has semi-active homing, it will be guided to its target by a missile fire control radar located on the ship. Semi-active missiles may be launched only if the firing ship's missile fire control radar is successfully tracking an opposing ship during the phase. Once a semi-active homing missile is launched, the radar must continue to track the same target during each phase until the missile reaches the target. Should the radar fail to track the same target ship during a phase in which the missile is still flying, the missile will immediately be removed from the game. Semi-active missiles may only be controlled by the proper missile fire control radars, never any other radar. Once launched, the missile can only be controlled by the radar that was tracking the target at the time of launch; if that radar fails to track the target during a phase, no other radar, not even an identical missile tracking radar, can control the missile.

No more than one missile may be directed against a target by a single radar during a phase. Thus, if a missile is launched against a target and it flies for more than one phase, no additional missile may be launched against the target until the phase after the phase the missile homes in on the target unless the new missile can be directed by another radar. Since more than one radar can be directed against a single target, more than one missile can be directed against a target provided each missile is controlled by its own radar.

Note: When determining if a missile fire control radar is successfully tracking a target **after** the missile is launched, measure the distance between the second from the last missile counter (rather than the radar) and the target. If this distance is equal to or less than the range given by the Radar Adjustment Table, the target is being tracked regardless of the distance between the radar and the target as long as the distance between the target and the radar does not exceed the Radar Detection range given on the Radar Detection Table, and the radar is not defeated by ECM.

7. ACTIVE HOMING--DESCRIPTION AND RESTRICTIONS:
a. If the missile is an active homer, it will require no continuous guidance from the firing ship. At a pre-selected point, the homing head in the missile will activate, and search for a proper target. If one is detected, the missile will move to intercept it. Thus, active homing missiles acquire their own targets; once launched, the launching vessel need not maintain any contact with the missile. Due to this fact, any number of active homing missiles may be fired simultaneously against a single target by a launching vessel.

b. The active homing heads of these missiles are capable of acquiring and homing in on targets by any of the following methods:

1. Radar
2. Infra-red
3. Anti-radiation
4. Home on jamming

Not all missiles may home in on targets by all of the methods listed above; the SSM Data Table indicates the methods of homing (and target acquisition) available to each missile. At the time of launch, the launching player must choose the method by which his missiles will attempt to home in on targets and indicate it in writing. A missile capable of radar or anti-radiation homing and homing on jamming may be set to home on jamming in addition to radar or anti-radiation homing; in all other cases, each missile may be set to home in by only **one** of the methods.

c. In addition to indicating the method of homing, the launching player must indicate the minimum size of the target that the missile will home in on. The size indicated may be small, medium or large. Only one target size may be chosen regardless of the number of methods of operations chosen.

d. Also, a player must indicate the point at which the missile will begin homing. Each missile can begin homing only at one point in its flight, regardless of how many methods of homing it has; once a missile reaches the point homing begins, all of its homing method's will immediately become operational. Until the point chosen is reached, the missile will be unable to hit any target; once the point is reached, the missile will begin searching until it acquires an acceptable target. To indicate the point homing begins, merely write down the distance as measured from the initial missile counter placed on the playing surface. When the length of the missile's flight, as measured from the initial missile counter, is equal to the distance chosen, the missile's homing head will be activated. Note that each missile has a minimum range; the point of which homing begins may never be less than the missile's minimum range.

Special: When firing a missile at a target that is not being tracked either visually or by radar (see 4, c above), the point at which homing begins must be equal to the minimum range of the missile; the player does not have the option to delay homing until some later point in its flight. This situation can occur only when firing missiles capable of being launched at untracked targets (i.e., Harpoon, SS-N-2, SS-N-7, SS-N-9, and SS-N-11).

e. Finally, the player must indicate the size of the area of search. The size may be very narrow, narrow, medium, wide or very wide. The length of the area of search is always equal to the distance travelled by the SSM each phase. The **total** width of these areas is as follows:

1. Very narrow	-	2"
2. Narrow	-	4"
3. Medium	-	8"
4. Wide	-	16"
5. Very wide	-	32"

If the area chosen is too narrow, the missile might be unable to acquire a target; but if it is too wide, the missile may home in on a target other than the one desired or actually miss the target.

When a missile is fired at a target that is **not being tracked** by a gun director or a radar capable of guiding the SSM, the size of the search area must always be very wide; the player may not choose a smaller size.

8. MISSILE MOVEMENT:
a. After determining if any missile has hit a target, all missiles which are still flying may be moved. To move a missile, merely consult the SSM Data Table to determine the speed of the missile and then measure that distance from the last missile counter placed on the playing surface. A new missile counter bearing the same number as the prior counters will be placed at this point. Unless the SSM Data Table indicates that the missile is a semi-active homer or is capable of mid-course correction, the missile must move in a straight line. Thus, the flight path of each missile will be marked by a line of counters bearing the same numerical designation, with the distance between each counter equal to the speed of the missile. Each phase a new missile counter will be placed on the playing surface until the missile homes in on a target or the missile reaches its maximum range; whenever either of these occur, remove all missile counters marking the path of the missile.

b. If the missile is capable of mid-course correction, the direction in which the missile is moving may be changed by up to 45° each phase at the beginning of the missile's move, provided the target is being tracked by the proper gun director or missile tracking radar during the phase, and the unit tracking the target is in communication with the missile via radio or data link. In addition, whenever an active homing missile's target is being tracked, the player may change the missile targeting data (i.e., the point at which homing begins, the smallest target the missile will home in on, the method of homing, and the size of the search area). If an active homing missile's target was not tracked at the time of the launch, it must be tracked by a unit having a proper gun director or missile tracking radar and which is in communication with the missile before the missile may begin homing unless the missile is a Harpoon, SS-N-2, SS-N-7, SS-N-9 or SS-N-11 already set to search a very wide area. If the missile's target is not being tracked during a phase, the missile's targeting data may not be changed during that phase, nor may the missile be turned. The missile will suffer no speed loss for turning.

c. Semi-active homing missiles will always be moved directly toward the target's position, even if the missile must turn to do so. It will suffer no speed loss for turning.

d. In all cases, whether the missile is capable of turning or not, each subsequent missile counter must be closer to its target than was the previous counter.

9. MISSILE FLIGHT TRAJECTORY:
a. Missiles may fly at only one altitude; the altitude level for each type of missile is listed on the SSM Data Table. At the point of launch, the missile is assumed to climb immediately to its proper altitude and it remains at that altitude until it reaches its target.

b. The altitude of the missile affects the chance of it being detected by opposing radar. The lower the missile flies, the shorter will be the distance to the radar horizon, so the chance of the missile escaping radar detection increases at lower altitudes. However, as noted on the SSM Data Table, SSM's which fly at very high altitudes are usually much faster than those that fly at low altitude.

c. Active homing missiles which are listed as flying at surface skimming altitude actually cruise at an altitude that is slightly higher than true surface skimming height until they acquire a target and begin homing. Once a target is acquired, the missile usually dives to true surface skimming height to make detection more difficult. To simulate this, until the phase in which the missile acquires a target, add 12" to the maximum detection range given on the Radar Detection Table when opposing units search for the missile with radar, and whenever the missile uses its own radar to search for targets. This adjustment is made only to the detection range given on the Radar Detection Table, not to the range given by the Radar Adjustment Table, so if the range given by the Radar Adjustment Table is less than the range given on the Radar Detection Table, there is no effect (see the radar search procedure rules for the explanation of the use of the Radar Detection Table and the Radar Adjustment Table). Once a missile has acquired a target, there will be no further adjustment to the detection range given on the Radar Detection Table.

Exception: After a Harpoon or SS-N-7 acquires a target, the radar detection range given on the Radar Detection Table will continue to be increased but by only 6".

Note that this rule applies only to active homing missiles; semi-active homing missiles fly at true surface skimming altitude throughout their entire flight.

10. SEMI-ACTIVE MISSILE HOMING:
If a semi-active missile is "moved" in such a way that its flight path touches the bridge of the target ship, the missile may home in on the target. Rather than placing the missile counter at the point where its move should have ended, place the counter in such a way that it is touching the target ship. If the missile had not yet been detected, the player owning the missile will inform his opponent of the type of missile that is homing in. During the next movement phase, the missile counter will remain touching the target ship, even if that ship moves; merely move the missile counter with the model or counter of the target ship. The missile is considered to be homing in during the subsequent combat phase. During the SSM segment of that phase, the players will determine if the missile hit the target and the amount of damage caused.

11. ACTIVE MISSILE - TARGET ACQUISITION AND HOMING:
a. After the "movement" of missiles is completed, the owning player will place a marker (coin, etc.) at the point along the flight path where the missile's homing head was activated if the missile passed this point during its move. This marker will remain as long as the missile continues to fly.

b. During the electronic search segment of the phase following the phase in which the missile's acquisition and homing head was activated, the missile will begin to attempt to acquire a target. A target is acquired if it is detected by one of the missile's methods of methods of homing. If a missile acquires one or more targets during a phase, it will home in on one of them. If the missile fails to acquire a suitable target, it will attempt to acquire a target during each subsequent electronic search segment until it is successful or flies out to its maximum range and is removed from play.

c. Determining if a target is acquired - basic procedures:

1. Missiles will attempt to acquire targets just **before** the use of search radars is resolved. This applies to all missiles regardless of the type of homing used by the missile. The opposing players will turn their backs to the playing surface when the other players determine if acquisition and homing occur.

2. To determine if a target is acquired, a player must first determine the missile's area of search in accordance with Rule 12 below.

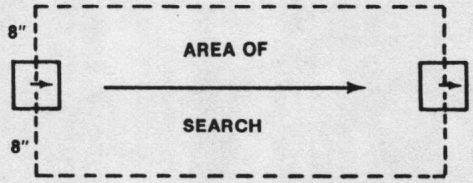
3. He will then determine if the missile acquires a target in accordance with Rule 13.

d. If targets are acquired, the missile will home in on one during the same phase.

12. ACTIVE HOMING - DETERMINING THE MISSILE'S AREA OF SEARCH:
This is done by first placing a ruler so that one end rests on the last missile counter, while the other end rests on the second from the last missile counter.

Exception: If the missile's homing system was initially turned on during the prior combat phase, the other end of the ruler will rest on the point where the homing system turned on, rather than on the second from the last counter. The area of search will extend perpendicular to this line in **both** directions. The distance the area extends in each direction is based on the size of the search area:

Very narrow	-	1"
Narrow	-	2"
Medium	-	4"
Wide	-	8"
Very wide	-	16"



The area of search of a missile searching a wide area.

13. ACTIVE HOMING - DETERMINING IF A TARGET IS ACQUIRED
a. As indicated earlier, the players will determine if their missiles acquire target just before the use of search radars is resolved. Targe acquisition for all missiles must occur before the use of any search radars, on either side, is resolved.

When attempting to acquire a target, a missile will scan a portion of its area of search to determine if there are any elligible targets there. I there are one or more targets there, the missile will attempt to home in on the target having the highest priority (as explained below). If the missile is unable to acquire a target in the portion of the area of search which it scanned, it will scan the next portion; it will continue doing this until it acquires a target or has searched the entire area of search.

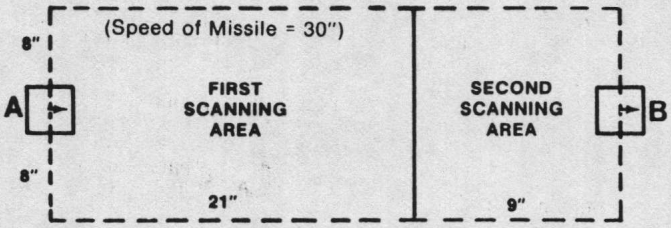
The portion of the area of search that is scanned by the missile is called the scanning area. The first scanning area begins at the second from the last missile counter, while the last scanning area ends at the las missile counter. The width of the scanning areas is always the same a the width of the area of search; the length is based on the size of th area of search:

Very narrow	6"
Narrow	12"
Medium	18"
Wide	21"
Very wide	24"

Example: If a missile is set to search a narrow area, it will scan the firs 12" of the area of search in an attempt to acquire a target. Only if n target is acquired will it scan the next 12".

The boundary of a scanning area can never extend beyond the boundary of an area of search. Thus, the last scanning area will always end at the same place that the area of search ends, even if that results in the last scanning area being shorter than the distances given in the table above.

The illustration below shows the scanning areas of a missile set to search a wide area. The second from the last SSM counter is at point A, the last missile counter is at point B.



b. Before searching any counters, the player commanding the missile should determine which unit would be the target of highest priority were it to be detected by the missile. To determine which target would be of the highest priority, see Rule 14 below. After determining which unit is of the highest priority, the player commanding the missile will have the missile search for it as described below. If the unit is detected, the missile will home in on it. If the missile does not detect the target, determine which unit would be the next highest in priority and then determine if the missile detects it. Continue following this procedure until the missile detects a target (and automatically homes in on it) or it searched for all units but failed to acquire any. Of course, when following this procedure, do not search any additional units after the missile succeeds in detecting one.

c. If one counter represents several missiles, the owning player attempts to acquire a target for each missile **separately**. For each missile in turn, the owning player will search all opposing units, beginning with the one of the highest priority, until it succeeds in detecting (and acquiring) a target, or fails to detect any. He will then do the same for each additional missile in turn until all missiles have detected a target or failed to detect any of them.

As indicated in Rule 15, the last SSM counter will be moved to the point next to that occupied by the unit the missile is homing in on. If a missile counter represents several missiles which are homing in on several targets, place a missile counter next to each such target.

d. After determining which opposing counter is of the highest priority, the player must determine if any of the circumstances below, which reduce the chance of detection by the missile's homing head, apply to that unit. If one or more apply, pick one card (pick only one card regardless of the number that apply). As indicated below, unless the card is of the proper suit and/or indicates the proper number, the missile will be unable to acquire the target. If the card is of the proper suit and indicates the proper number, the missile **may** acquire the target. Section e below will indicate if the target is acquired. If the missile fails to acquire either because one of the factors below apply and the improper card was picked, or because the requirements in e below are not met, the player owning the missile will attempt to acquire the target having the next highest priority using the procedures in d and e. Continue in this manner until either a target is acquired or all possible targets are searched.

The circumstances that can prevent a missile from acquiring a target are as follows:

1. Missiles set to search medium, wide, or very wide areas -- If the missile is set to search areas of these sizes, it may fail to detect and acquire the target. If the missile is set to search a medium or wide area, it will be unable to detect and acquire the target if the card picked is a heart; if the missile is set to search a very wide area, it will fail to acquire the target if the card is a heart or diamond. INCORRECT See Sea Command p. 56 #1

2. Targets that are too close to the point the missile's homing head activated -- Missiles require a certain amount of time to search for and acquire targets. If the missile is too close to a target at the time its homing head activates, it may not have sufficient time to acquire the target. If the distance between the target and the point the missile's homing head activated is less than or equal to 25% of the missile's speed, the missile will fail to acquire the target unless the number on the card picked is 3 or less. If the distance between the target and the point the missile's homing head activated is greater than 25% but less than or equal to 50% of the missile's speed, the missile will fail to acquire the target unless the number picked is 5 or less.

Example: If a missile has a speed of 30" per phase, the missile will fail to acquire any target within 7-1/2" of the point the homing head activated unless a 1, 2, or 3 is picked. It will fail to acquire targets that are between 7-1/2" and 15" from the point the homing head activated unless a 1, 2, 3, 4, or 5 is picked.

e. If the restrictions in d above do not prevent the missile from acquiring the target, the following requirements must be met for successful target acquisition:

1. If the missile is set for homing on jamming, it will automatically acquire the target if it has a "noise" counter next to it.

2. If the missile is set for anti-radiation homing, it will automatically acquire the target if it has a "radar" counter next to it.

3. If the missile is set for infra-red homing, it will automatically acquire the target if the target is within 8" of the flight path. As indicated in Rule 14 below, the missile may acquire and home in on flares that are within 8" of the flight path.

4. If the missile is set for radar homing, pick another card and consult the Radar Adjustment Table to determine the maximum radar detection range during that phase. Follow the normal radar search procedures for determining maximum detection range. The Basic Strength of all missile radars is 10, and any ECCM is listed on the SSM Data Table. If the target is within maximum radar detection range, it is acquired. As indicated in Rule 14 below, missiles set for radar homing may acquire and home in on chaff counters that are within 1" of the flight path. When noise jamming SSM's, the missiles cannot reduce gain. Should the missile detect a counter which is a "dummy", the missile will not acquire it; it will continue searching until a proper target is acquired.

f. Multiple homing: If a missile is set to home in by more than one method, conduct target acquisition separately for each method beginning with the method having the highest priority. Thus, if a missile is set for radar homing and home on jamming and it fails to acquire any target by the home on jamming method, it may search the same units using the radar method. However, the procedures given in d above are only followed once per target; if the card picked would not allow the missile to acquire the target, all methods of homing on the missile are incapable of acquiring it.

Note: Although the launching rules require that a target must be located by the firing ship and (usually) tracked by one of its directors or radars during the phase of launch, the missile is not required to home in on that target; it will instead home in on any target meeting the acquisition requirements.

14. ACTIVE HOMING -- TARGET PRIORITY AND SIZE:

a. If a missile is set to home in by only one of the methods given in rule 7,b, the order of priority among the possible targets is based solely on their size. The largest target always has first priority, followed by the second largest target, etc.; the smallest target is the one having the lowest priority. To determine which target is the largest, do as follows:

1. If the method of homing of the missile is anti-radiation or home on jamming, the largest target is the one closest to the second from the last missile counter that is using a jammer or radar that can be detected by the missile. Missiles using either of these two methods of homing are incapable of rejecting any target and will home in on ships, helicopters at surface skimming altitude, or decoys if they are using jammers or radars that can be detected.

2. If the missile is set for radar homing, the size of the targets is the same as the size designation on their counters, i.e., ships represented by "Small" counters are small targets, ships represented by "Medium" counters are medium targets, while ships represented by "Large" counters are large targets. If a target is not represented by a counter, ships having a displacement of under 1000 tons are small targets; those with a displacement of 1000 to 10,000 tons are medium targets, while ships of over 10,000 tons are large targets. The actual displacements of the targets does not directly affect the target priority, e.g., if one target has a displacement of 15,000 tons and another has a displacement of 11,000 tons, both are large targets and have the same priority, the 15,000 ton ship is not considered larger than the 11,000 ton ship.

Exceptions: If a target is using a radar reflector or blip enhancer, it will be considered to be a large target regardless of its actual displacement. Also, if a target is presenting its bow or stern to the

second from the last missile counter, it will be assumed to be one level smaller than it actually is unless it is using a blip enhancer or radar reflector. Thus, for example, ships larger than 10,000 tons will be considered to be medium targets, ships of between 1000 and 10,000 tons will be considered small targets, while ships smaller than 1000 tons will be considered very small targets.

If several ships are of the same size, the vessel closest to the second from the last missile counter is assumed to be the target of highest priority, while the vessel furthest from the second from the last missile counter has lowest priority. INCORRECT SEE SEA COMMAND P.56 # 2

Also, if there are any chaff counters within 1" of the flight path, the chaff may have the highest priority. Pick one card during any phase in which the missile passes within 1" of one or more opposing chaff markers to determine if the missile determines the chaff to be the target of highest priority during that phase. Only one card is picked regardless of the number of chaff counters that are within 1" of the flight path. If the missile has neither MTI nor a pulse doppler radar, it will acquire the chaff and home in on it if the card is a spade or club. If the missile has either MTI or pulse doppler, it will acquire the chaff only if the card is a spade. If the chaff is acquired, the missile will home in on the chaff counter that is closest to the second from the last missile counter. If the missile homes in on a chaff counter that is not within 1" of a ship, the missile is removed from play. If the chaff counter the missile home in on is within 1" of a ship, the missile **can still hit that ship**, and the missile is treated as if it were homing in on that ship. See rule 19, c (1) for the effect of chaff within 1" of a target ship. If the missile fails to acquire the chaff, any ship within 1" of the chaff is still considered "protected" by it, so when the missile searches the ship, reduce the chance of the ship being detected in the same manner that the chance of such protected ships is reduced when being searched for by a normal search radar.

Note: The rules relating to the inability of missiles to acquire certain targets, given in Rule 13, d above, also apply to chaff. When either or both of the situations described there apply to chaff counters that are within 1" of the flight path, first determine if the missile can acquire any chaff by picking one card as indicated earlier in this rule. If the missile can acquire chaff, it will then be necessary to pick one card for each chaff counter that the situations described in Rule 13, d apply to. If the card picked is not of the proper suit or number indicated in that rule section, the missile will be unable to acquire that counter. Continue doing this until the missile either acquires one chaff counter or fails to acquire any within its area of search. If the latter occurs, the missile will be unable to acquire chaff during that phase, but it may acquire and home in on ships. The player will then determine if the missile acquires any ship targets.

Special: If a chaff counter is within 1" of a ship and due to the privisions of Rule 13, d, the missile is unable to acquire the chaff, the missile is also automatically unable to acquire any ships within 1" of the chaff counter.

3. If the missile is set for homing by the infra-red method, a ship with a displacement of over 10,000 tons is a large target, a ship with a displacement of between 1000 and 10,000 tons is a medium target, and a ship with a displacement of less than 1000 tons is considered a small target. If there are several targets of the same size, the target having the highest priority is the one closest to the second from the last missile counter. If there are flares within 1" of the missile's flight path these may appear as the largest targets, so flares may be the targets having the highest priority. When one or more flares are within 1" of the flight path, pick one card, regardless of the number of such flares. If the card is of any suit except heart, the missile determines the flares to be the targets of highest priority and will home in on the flare counter closest to the second from the last missile counter. If the missile homes in on any flare, even a flare within 1" of a ship, the missile is immediately removed from play. The provisions of Rule 13, d also apply to flares. Follow the procedures given for chaff in (2) above to determine the effects of rule 13, d on flares.

4. Decoys: Decoys can be designed to attract active homing missiles. However, decoys other than **towed** decoys equipped with blip enhancers, can never appear as large as surface ships. Therefore, the decoy counters will always have the lowest priority. However, if a missile searches an area where it fails to acquire a target, it must then search each decoy counter in the area, provided the decoy is provided with equipment that can attract a missile and the missile is capable of acquiring small targets. If these requirements are met, pick one card for **each** decoy counter in the area. If the card is a spade, the missile homes in on the decoy. Remove the missile from play immediately, and after all SSM target acquisition is completed, also remove from play all decoy counters which have SSM's homing in on them.

Towed decoys are much larger than other decoys and may be made to appear as a ship of any size to radar homing missiles if equipped with blip enhancers. If a ship is using a towed decoy, the decoy will be the target of highest priority to radar homing missiles. However, since the decoy is so close to the towing ship, the ship is still in danger of being hit by the missile. Thus, the missile is considered to be homing on the towing ship as well as the decoy. The effects of the towed decoy will be explained in Rule 19, c (1).

Note: If a unit is "detected" by a missile, the opposing ships and aircraft will not be able to receive this information. Therefore, no unit detected by a missile will ever be considered "located" by the opposing force.

b. As indicated earlier, a missile can be programmed to home in on targets only if they are larger than a certain size, and reject all potential targets smaller than that size. The rules given in a determine the size of the target; if the size of a potential target as determined in a above is smaller than the smallest size the missile is programmed to accept, it cannot be acquired.

c. If a missile is set to home in by more than one method, the order of priority of the method of homing, given below, has an effect on determining which target has the highest priority. The priority of the method of homing takes precedence over the size of the target; thus, any target capable of being detected by the method of homing having the highest priority will have a higher priority than any target, even larger ones, capable of being detected only by a method of lower priority. If there are several targets capable of being detected by the method of highest priority, the size of these targets, as determined in a above, will determine which is acquired and homed in on. The order of priority of the methods of homing is as follows:

1. Home on jamming
2. Radar homing
3. Anti-radiation homing
4. Infra-red homing

Thus, for example, if there are several vessels capable of being detected by the home on jamming method and a larger vessel capable of being detected only by radar homing, all of the vessels capable of being detected by home on jamming have a higher priority than the vessel capable of being detected only by radar homing.

15. ACTIVE MISSILE HOMING:
After a target has been acquired, the missile will home in it. Remove the last missile counter from its current location and place it so that it is touching the model or counter of the target. During the SSM segment of the combat phase in which the target was acquired, determine if the missile hits the target and the amount of damage caused by it. The missile is considered homing from the time it acquires a target until it either hits or misses during the SSM segment.

Also, place one card next to each target for every missile homing in on it. As the missiles are defeated by ECM or weapons, remove one card every time one of the missiles is defeated. In this way, players can easily keep track of the number of missiles which are still capable of hitting the target.

16. SPOTTING MISSILES IN FLIGHT:
a. Detection by radar detectors: Only missiles set for active radar homing can be detected by radar detectors, and the detection will occur at the normal time when the use of radar detectors is resolved. Of course, radar homing missiles cannot be detected until their homing heads are turned on. Semi-active missiles can never be detected by radar detectors.

Before the use of radar detectors is resolved, the player owning any missile that is set for radar homing and has already turned on its homing head will announce the width of the missile's area of search. When resolving the use of a radar detectors, the opposing player will determine if any of his units can detect the missile with their radar detector. Units with working radar detectors will detect the missile if the distance between the unit and any point along the flight path between the last and second from the last missile counters is less than or equal to three times the total width of the area of search as given in rule 7,e.

Example: If the opposing player indicates that the missile's area of search is medium, it has a search area 8" long. The searching player will determine if any of his units are within 24" of any point along the flight path between the last and second from the last missile counter. If there are any units, they will detect the missile if they have working radar detectors.

If any unit detects the missile, the detecting player may write the number on the initial SSM counter on the proper place on the detecting units TDD's.

b. Detection by radio detector: As indicated earlier, some missiles are capable of mid-course guidance which allows them to be turned in flight. Turning is accomplished at the beginning of a missile's move. If there is an opposing counter or unit lying directly between the last missile counter and the guiding unit before a missile is moved and the player commanding the missile intends to turn the missile during that phase, he must point out to his opponent which of the opposing units are in a position capable of detecting the radio transmission between the guiding unit and the missile. The opposing player must then indicate if the counters in position to detect the radio transmission are real units having working radio detectors. If they are real units with working radio detectors, the player commanding the missiles must reveal the location of the guiding unit; both the guiding unit and the missiles are immediately detected by the radio detectors. If the units in position to detect the radio transmissions are only "dummy" counters, the position of the guiding unit need not be revealed, and neither the guiding unit nor the missiles are detected. The player commanding the units in position to detect the radio transmissions need not reveal that the units are real if he does not wish to do so; he may indicate that they are "dummies" or have no working radar detector, but if he does so, neither the guiding unit nor the missiles can be detected.

c. Detection by radar: All missiles in flight may be detected by searching radars, even if their homing heads are not turned on. Before resolving the use of searching radars, the players commanding SSM's must indicate the altitude levels at which each of their missile's are flying. The opposing player will then determine the maximum detection ranges of all of his searching radars in accordance with the normal radar search rules. He will then measure the range between the missile's flight path for that phase and each radar. If the range **at any point** is less than or equal to the radar's maximum detection range, the missile counter is detected.

Note: To determine if the missile is presenting its bow or stern aspect, look to the second from the last SSM counter. The position of this counter will determine which aspect is being presented.

If the missile counter is detected, the player may record the designation of the SSM counter on the TDD's of the detecting unit and all units connected via data link to it. The player commanding the SSM's must indicate the number of missiles represented by the detected counter if the detecting player asks him to do so.

Missiles are frequently detected by air search radars. There are actually two types of air search radars: 2D and 3D. The 2D radars have longer ranges, but the 3D is capable of providing more accurate information. Many ships equipped with 2D radars for long-range search are also equipped with 3D radars to allow faster firing against air targets. Most ships that are equipped with 2D radars but which do not have 3D radars in addition are equipped with height finding radars. As will be explained below, the ability of a ship to fire upon missiles detected by air search radars will be influenced by whether the detecting ship is equipped with a 3D radar, a height finding radar, or neither. Additional information on 2D and 3D radars can be found in the Modern Naval Warfare section of this book.

d. Detection by visual sighting: If a ship launches SSM's during a phase in which it is visually sighted by an opposing unit, the missiles are immediately sighted. If the launch of the missiles was not spotted, the missiles will be visually sighted if any point along the missile's flight path between the last missile counter and the second from the last missile counter is within visual sighting range of an opposing unit during any electronic search segment of a combat phase. Missiles can only be visually sighted during the electronic search segment of the phase, not during the visibility segment. Determine if all missiles are spotted after all SSM target acquisition has been resolved, but before the use of searching radars is resolved.

To determine visual sighting range, both players will each roll one decimal die during any electronic searching segment if any opposing missiles are flying. Using the number rolled, consult the SSM Visual Sighting Table to determine the maximum range at which **all** of the player's units can visually sight missiles. The die is rolled only once regardless of the number of missiles or units in the player's force, and the number rolled will affect all units. As indicated on the SSM Visual Sighting Table, the maximum sighting range may be adjusted based on the size of the missile or sighting unit. These adjustments will affect each unit only if the situations actually apply to them. Thus, adjustments are applied on a unit by unit basis and only those adjustments that actually apply to the searching unit and the missile being searched will affect the result of that search attempt.

Once a missile has been visually sighted by a unit it will remain sighted by that unit as long as it remains within the maximum possible visual sighting range. The maximum possible visual sighting range is the sighting range that would result if the SSM Visual Sighting Table was consulted and a 1 was rolled. Thus, the maximum possible visual sighting range against medium-sized surface skimming missiles is 18", since this is the visual sighting range that would result if a 1 was rolled and the SSM Visual Sighting Table was consulted.

17. COUNTERMEASURES AGAINST MISSILES:
The following countermeasures are capable of defeating SSM's:

1. ECM beefore the missile acquires a target, i.e., when the missile is searching for a target.

2. ECM after a missile acquires a target and begins homing in on it.

3. Shooting down the missile with guns or SAM's.

18. ECM BEFORE MISSILE TARGET ACQUISITION:
ECM can be used before the missile acquires a target in order to obscure true targets from the missile or cause the missile to home in on a false target. Chaff, decoys, flares, reflectors and noise jammers can accomplish such tasks. Just follow the normal ECM vs. searching radar procedures when using ECM before target acquisition. Bear in mind that the active homing missile's radar is immune to false target generation, just like other fire control radars.

19. ECM AFTER MISSILES ACQUIRE TARGETS:
a. When a missile has acquired a target and begins homing in, the missile will be susceptible to ECM during the phase of homing just as if the missile were a fire control radar attempting to track a target. The use of ECM against homing missiles will be resolved immediately after the end of the electronic search segment of the phase, before resolving any gunnery. At that time, units may use radar jammers or launch chaff or flares as desired if the requirements for using ECM are met. The requirements for using ECM against homing missiles are the same as for using ECM against fire control radars. Thus, only the target and units within 3" of the target may use ECM, and in addition, the requirements for the use of the ECM devices, given in Part D of section XV, must also be met. In addition to using the normal radar countermeasures, which are only effective against radar homing missiles, the units meeting the requirements for using ECM against fire control radars may also launch flares, or turn jammers and radars on or off as desired at this time in order to defeat the missile.

b. If the requirements for using ECM are met, the player commanding the target must announce that he wishes to use ECM, and he must then determine if there is enough time to use the ECM effectively. If the missile was initially detected by any method during a prior phase, the detecting unit and all other units in communication with it by any method (not just data link) have sufficient time to use ECM. If the missile was initially detected during the phase of homing, the following applies:

1. If the missile is detected by a radar detector having a rating of A, the detecting unit and all units connected by data link to that unit may use ECM.

2. If the missile is detected by a radar detector having a rating of B, or by any other method (radar, visual sighting), ECM may be used only by those units which have an ECM system rated A and which also either detected the missile or are connected by data link to a detecting unit. No unit having a B ECM rating may use ECM against the missile, and a unit which did not detect the missile and which also has no data link connection to a detecting unit may not use ECM regardless of its ECM rating.

c. After determining what ECM, if any, can be used against a missile, the player commanding the target ship will announce what ECM is being used. His opponent will then pick a card for each missile against which ECM is being used, and will determine if the ECM defeats the missile. The effects of ECM are as follows:

1. If the missile is semi-active or active radar homing, the missile can be defeated only by range or velocity gate pull-off and chaff; noise jamming will have no effect. The requirements for defeating such missiles are the same as for defeating a fire control radar. If range or velocity gate pull-off is used, the missile's radar will be defeated if the card is of the proper suit; if chaff is used, the missile will be defeated if the number on the card is not a multiple of the proper number indicated in the chaff rules. If a ship is within 1" of a chaff counter that was acquired by the missile, the missile will hit the ship unless defeated by the chaff at this time.

If a ship is towing a decoy, range or velocity gate pull-off will always succeed if the card is a diamond. This is in addition to the usual suits that result in success of this technique. If range or velocity gate pull-off succeeds, the decoy is always destroyed at the end of the phase.

2. If the missile is homing on jamming, it can only be defeated if the target ship shuts off its noise jammer. If it does so, the missile will be defeated if the card picked is a heart or diamond. If the card is a club or spade, the missile will continue homing in on the target. Chaff and deception jamming have no effect on missiles that are homing on jamming.

3. If the missile is an anti-radiation missile, it can only be defeated if the target turns off its radar. (Turning off a radar is an ECM technique and can only be accomplished during missile homing if the target detected the missile.) If the target does so, the missile will be defeated if the card picked is a heart or diamond.

4. If the missile is an infra-red homing missile, it can be defeated only if a flare is within 1" of the missile's path. If there is a flare, the missile will be defeated if the card picked is of any suit except spade.

Exemption: If the missile had an opportunity to acquire the flare during the SSM target acquisition portion of the phase but failed to do so, the flare can no longer affect the missile; each flare receives only one opportunity to distract each missile. However, the missile can still be distracted by any flares launched **after** homing began.

5. Multiple methods of homing: Whenever a missile set for more than one type of homing acquires a target, it cannot be defeated by ECM unless **all** of its methods of homing are defeated.

Example: If a missile is set to home in by radar and by home on jamming, it will not be defeated unless the target defeats both home on jamming and radar. The fact that the missile acquired the target by only one method has no bearing, since as soon as the target is acquired by one homing method, it is automatically acquired by all of the others.

d. ECM vs semi-active homing missiles: Since these missiles are controlled by a radar mounted on a ship, not one mounted in the missile itself, the ship-mounted FC radar must be defeated in order to defeat the missile. That radar can be defeated by ECM in the same manner as any other FC radar. During every combat phase in which the missile is flying, the target must be tracked by the radar, and ECM may be used against the radar whenever it is used. Normally, the ship controlling the missile must attempt to track the target during the SSM segment of the phase. However, during the phase the missile is homing in on the target, the attempt at tracking must be resolved immediately after the end of the electronic search segment of the phase. The procedures for tracking the target during this phase are the same as for any other phase, and ECM can also be used in the normal manner. Remember that in order to determine if the target is within detection range of the radar, measure the distance between the target and the second from the last missile counter; do not measure the distance between the target and the radar.

20. FIRING AT MISSILES--REQUIREMENTS:

a. Both players may fire guns and SAM's at SSM's during the gunnery segment of each combat phase.

b. In order to fire at an SSM, the following requirements must be met:

1. The missile must be detected by the radar or by visual sighting of the firing unit or a unit connected by data link to the firing unit. Detection by passive sensors (radar detectors, radio detectors) is not sufficient to allow firing at missile targets.

2. At least one point on the missile's flight path between the last and second from the last missile counter must be within range of the firing weapon.

3. The guns or SAM's must not have been fired at surface targets during the phase. If a gun or SAM is fired at a missile, the weapon may not subsequently be fired at surface targets during the same phase. Guns and SAM's may be fired against both aircraft and missiles in the same phase, and they are capable of firing at more than one missile or aircraft during a phase.

4. The gun or SAM mount must be able to bear on the target missile.

c. Weapons bearing: A weapon may not be fired against an SSM unless it is capable of bearing on the missile. To determine this, first determine which aspect the firing unit is presenting toward the second from the last SSM counter. If this counter is off the firer's bow, the firer is presenting its bow aspect; if the SSM counter is off the firer's stern, the firer is presenting his stern aspect; if the counter is off either side, the firer is presenting the proper side aspect. The effect of this is as follows:

1. If the firer is presenting its bow aspect to the second from the last SSM counter, the unit may fire all weapons except those located on the stern.

2. If the firer is presenting its stern aspect, all weapons except those located on the bow may fire.

3. If the firer is presenting a side aspect, all weapon's may be fired except those located on the opposite side.

d. To resolve all AA fire, AA weapons are grouped into batteries by the firing player, and the firing of AA weapons is resolved one battery at a time. A battery is defined as a single weapons mount or a group of weapons mounts of the same type which are engaging a single target. A battery of guns can consist of several gun mounts, and each gun mount may be part of only one battery. A battery of SAM's can consist of no more than **one** SAM mount, but as explained below, one SAM mount can form two batteries. Normally, the firing of each battery will be controlled by a fire control radar, although this is not required if the battery consists of guns. More than one battery may engage the same target.

e. Gunnery and fire control radars: Gunnery fire control radars are mounted on gun directors; it is not possible to direct a gun director at one target and the fire control radar at another. Usually, the number of gun mounts on a ship exceeds the number of fire control radars and directors, and a player is permitted to fire each mount at separate targets. If this is done, the mounts firing at targets against which no gun director is used must fire by local control, with much lower accuracy than those mounts fired at targets tracked by a gun director or radar. Mounts fired by local control are assumed to have an FC rating of H.

f. Restrictions on SAM batteries:

1. Each SAM battery may consist of no more than one SAM mount.

2. Each SAM battery must be controlled by a proper SAM FC radar or optical director sight; local control SAM fire is not possible. A proper SAM FC radar is the type of radar capable of directing the SAM; the Radar Guide indicates which type of SAM can be directed by each radar. Most SAM's require that the target be tracked by the SAM's FC radar, but some SAM's can be directed by special optical director sights. The AA Table indicates which SAM's are capable of being fired by an optical sight. The optical director sight and the battery's FC radar must always be directed against the same target; it is not possible for an FC radar to track one target while the optical sight tracks another. A SAM cannot be fired by an optical sight if the target has not been visually sighted by the firing vessel itself. If a SAM battery does not have an optical sight and its FC radar is unable to track its target during a phase, the SAM may not fire. If the SAM's FC radar is knocked out, its optical sight is knocked out also.

3. As indicated in (2) above, each SAM mount must be controlled by an FC radar or optical sight, and a battery of SAM's cannot consist of more than one SAM mount. However, each SAM mount can engage targets tracked by up to two such radars or directors at the same time. Thus, each SAM mount can form two batteries. Since each SAM FC radar (or director) can control only one battery at a time, the number of SAM batteries capable of firing can never exceed the number of SAM FC radars (or directors).

4. Few SAM's are capable of engaging targets that are flying at surface skimming altitude. The AA Table has an (SS) indication next to all SAM's capable of firing at surface skimming targets. All other SAM's may engage only those targets that fly above surface skimming level.

21. PROCEDURES FOR FIRING AT MISSILES:

a. Each player will fire his AA weapons one battery at a time. The procedures for firing each battery are as follows:

1. The use of the battery's fire control radar, if any, must be resolved. However, since current missiles carry no ECM and the ranges of the FC radars are normally much greater than the range of the weapon, the FC radar will automatically succeed in tracking the target if the target is a current-day SSM.

2. The firing player must determine the basic accuracy rate of the weapons being fired. The basic accuracy rates of all AA weapons are found in Part I of the AA table.

3. The player will then adjust the basic accuracy rate as indicated in Part II of the AA Table. A description of the accuracy adjustments is given in rules 22 and 23 below. Note

that the accuracy adjustments for guns are different from those for SAM's.

4. If guns are used, the player will then roll one decimal die for each gun fired. If SAM's are used, the player will roll one decimal die for each SAM mount. If a SAM mount forms two batteries, one decimal die is rolled for each battery; i.e., two dice will be rolled for the mount, one for each target.

5. After rolling the dice, consult Part III of the AA Table, cross-referring each number rolled with the adjusted accuracy rate of the battery. If a blank appears, the gun or SAM mount missed the target, while if a 1 appears, the weapon has shot down its target. If a number in parentheses appears on the AA Table, roll the decimal die again; if the number rolled at that time is less than or equal to the number in parentheses, the target is shot down, while if the number rolled exceeds the number in parentheses, the target is missed.

6. As explained in rule 22 below, if a battery shoots down its target, it may immediately fire at another aerial target (missile or aircraft) if the requirements for shifting fire are met.

22. ADJUSTMENTS TO THE AA GUN ACCURACY RATES:

a. As indicated above, a target may not be fired upon until it is detected by the firer by visual sighting or radar. If guns are fired at a target during the phase it is initially detected by visual sighting or radar, adjust the accuracy of all weapons as follows:

1. If the firing weapon has an FC rating of B-H, subtract 5 from its accuracy rate; if its FC rating is A, the accuracy rate is not reduced.

2. If the firing unit or a unit in communication with the firer detected the target with a radar detector or radio detector during the **prior** phase, the amount of adjustment in (1) above may be reduced. If the radar detection rating of the detecting unit is A, reduce the amount of reduction in (1) by 5. In other words, the accuracy rates of all weapons having any FC rating will not be reduced at all due to the provisions of (1) above if the target was detected during the prior phase by an A-rated radar detector mounted on the firing ship or a unit in communication with the firer. If the radar detection rating of the detecting unit is B, or if the detection was made by a radio detector, reduce the amount of adjustment in (1) above by 3. Thus, if a target was detected during the prior phase by B-rated radar detectors, the accuracy rates of all weapons having FC ratings of B-H will be reduced to 2 rather than 5; the accuracy rates of weapons having A FC ratings remains unreduced.

3. The type of radar equipment on the detecting unit may also affect the accuracy of firing during this phase. If the firing weapon has an A FC rating or if the target is at surface skimming altitude, there is no additional adjustment. Also, if the detecting unit is a ship equipped with a working 3D radar or an aircraft, there will be no additional adjustment to the accuracy rate. Finally, if the target is within the vertical and horizontal range of a TWS radar located on the detecting unit, there will be no additional adjustment to the accuracy rate. However, if none of the above apply, the accuracy rate will be reduced further. If the detecting unit is a ship equipped with a 2D radar plus a height finder (but no 3D radar), subtract an additional 5 from the accuracy rate. If the above conditions do not apply and the detecting unit is a ship equipped with neither a height finder nor a 3D radar, subtract 10 from the weapon's accuracy rates.

4. The type of detection also affects accuracy rates. If the target was detected by radar, there is no additional adjustment. If the target was not detected by radar (i.e., it was detected by visual sighting only), subtract an additional 5 from the accuracy rates.

5. Subtract an additional 3 from the accuracy rate if the firing vessel is a Soviet design.

Note: All of the adjustments above apply to the phase when the target is initially detected by radar or visual sighting; **none** of them apply during subsequent phases. Most of the adjustments above are based on the equipment, etc., of the detecting unit, not the firing unit, and they apply to all firing units. In all cases, the detecting unit upon which the adjustments are based must be either the firer or a unit connected to the firer by data link, except when explicitly stated otherwise. Detecting units which are not in contact with the firer do not affect accuracy or the ability to fire in any way. If there are several detecting units in proper contact with the firer, always base the accuracy adjustments on the detecting unit which provides the smallest adjustment.

b. The FC rating of the firing battery always affects its accuracy as indicated below:

FC Rating	Adjustment
A	+7
B	+5
C	+2
D	No Adjustment
E	-2
F	+2
G	-4
H	-7

c. Whenever a weapon is fired, measure the range between the firer and the closest point to it on the target's flight path for that phase. Reduce the accuracy rate as follows:

Range	Adjustment
Under 2"	No adjustment
2"-3"	-3
4"-5"	-5
6"-10"	-10
11"-15"	-15
16"+	-20

d. Adjust all accuracy rates based on the target missile's normal speed:

Target's Speed	Adjustment
Under 10"	+8
10"-19"	+5
20"-29"	+2
30"-39"	No adjustment
40"-49"	-1
50"-59"	-2
60"-69"	-3
90"-109"	-5
200"+	-8

When firing at missiles, their speeds are always considered to be the speed listed on the SSM Data Table. Thus, for example, the speed of Harpoons, Exocets, and Otomats is always 30" regardless of the distance actually travelled by the missile during the phase.

e. If the second from the last target counter is within maximum range of the firing unit, adjust the accuracy rate as follows:

1. If the distance between the firer and the second from the last target counter exceeds 75% or the gun's maximum range, there is no adjustment.

2. If the distance between the firer and the second from the last target counter is greater than 50% but less than or equal to 75% of the gun's maximum range, subtract 1 from the accuracy rate.

3. If the distance between the firer and that counter is greater than 25% but less than or equal to 50% of the gun's maximum range, subtract 3 from the accuracy rate.

4. If the distance is less than or equal to 25% of the gun's maximum range, subtract 6 from the accuracy rate.

f. Usually, a fire control radar is used to direct AA fire. However, in those situations when a fire control radar is not available, adjust the accuracy rate as follows:

1. If the firing unit has a search or TWS radar capable of detecting the target (i.e., the radar is operating and the altitude level at which the target is flying can be searched by the radar) or if the firer is connected by data link to a unit having such a radar, subtract 3 from the accuracy rate.

2. If neither the firer nor any unit connected by data link to the firer has a search or TWS radar capable of detecting the target, subtract 5 if the firer's gun director is operational and directing the fire of the battery.

3. If neither the firer nor any unit connected to it by data link has a radar capable of detecting the target, and the battery's fire is not being directed by a gun director, the guns must fire by local control. The FC ratings of the guns are reduced to H.

Note: None of the above adjustments apply if the battery's fire is controlled by a fire control radar. Also, the adjustments indicate that the accuracy rate is reduced to only a slight degree if either the firer or a unit connected by data link to it has a search radar capable of detecting the target. It is not necessary that this radar

actually detect the target; it is only required that the radar be working and capable of searching the altitude level at which the target is flying.

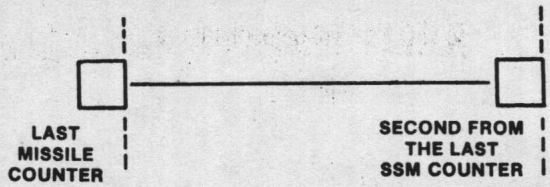
g. Special missile targets:

1. If a missile is homing in on a target during the phase of firing, and the cruise altitude of the target missile exceeds the vertical range of the gun, the gun may fire at the missile during that phase, but the accuracy rate is reduced by 1. **Example:** If an SSM flies at very high altitude and is homing in on a target, any gun having a vertical range less than very high may fire at the missile during the homing phase if the other firing requirements are met, but the accuracy rate of the gun is reduced by 1.

2. If the target is a Harpoon, subtract 2 from the accuracy rate during the phase the missile homes in on a target.

3. If the target is an Exocet or Kormoran, subtract 1 from the accuracy rate during the phase of homing if the gun is a 40mm prox. or 50mm or larger.

h. If the target's flight path for that phase is perpendicular to the position of the firer, the firing player may roll two times for each gun mount in the battery. The second roll is adjusted in the same manner as the first except that the adjustments in a and e above do not apply to the second roll. Thus, if the target's flight path is perpendicular to the firer, each gun mount fires twice at the target. The diagram below illustrates when the target's flight path is perpendicular to the firer. If the firer is located anywhere between the dotted lines, the target's flight path is perpendicular to the firer.



i. Shifting fire: If a battery shoots down a target, the entire battery may fire again at another missile or aircraft target immediately. When firing at the new target, compute accuracy in the normal manner, but in addition, reduce the accuracy rate as indicated below. If the accuracy rate is less than 1, no firing is possible. If the accuracy rate is 1 or more, roll one decimal die for each gun in the battery to determine if the new target is shot down. A battery may shift fire only if it successfully shoots down a target and its accuracy rate after all adjustments is 1 or higher. If either of these conditions are not met, the battery may not shift fire to another target. A battery may continue firing at additional targets as long as the requirements are met. **Example:** If a ship equipped with two 5"/54 guns successfully shoots down a missile, it may fire both guns at another missile (or aircraft) during the same phase. When firing at the new target, reduce the accuracy as indicated below in addition to the normal adjustments. If the battery again shoots down a target, it may fire at another. However, if the battery fails to shoot down its target or if its accuracy rate after all adjustments is less than 1, no further firing is possible.

When shifting targets, adjust accuracy as follows in addition to the normal adjustments:

1. The accuracy rate is adjusted based on the FC rating of the firing weapon:

FC Rating	Adjustment
A	-7
B	-8
C-F	-11
G	-14
H	-17

2. If the firing battery does not have an operating FC radar, subtract an additional 2.

3. If the firing ship is a Soviet design, subtract an additional 2.

4. If the target is at surface skimming altitude, or if the firing battery has an FC rating of A, or if the firer or a unit connected by data link to the firer detected the new target and has a 3D radar, there are no further adjustments. Also, if the new target is within the horizontal and vertical range of a TWS radar located on the firer or a unit connected by a data link to the firer, there are no further adjustments.

5. If the conditions in (4) do not apply and the firer or a unit connected by data link to the firer detected the new target and has a height finder plus a 2D radar, subtract an additional 3 from the accuracy rate.

6. If the conditions in (4) do not apply and if the firer and all other detecting units connected by data link to the firer have neither a height finder nor a 3D radar, subtract an additional 6 from the accuracy rate.

23. ADJUSTMENTS TO SAM ACCURACY RATES:

a. If the target was initially detected by radar or visual sighting during the phase, adjust the accuracy rate of all SAM batteries in the same manner that the accuracy rate of guns is adjusted when firing at targets initially detected during the phase. In other words, adjust the SAM's accuracy rates in accordance with rule 22,a above.

b. If **both** the last and second from the last target counters are within the **minimum** range of the firer, the SAM's automatically miss the target.

c. If the distance between the firer and the nearest point to it on the target's flight path for that phase is less than the minimum range of the SAM, subtract the SAM's Min. Range Red. (given in Part I of the AA Table) from the accuracy rate.

d. If **either** the last or second from the last target counter is beyond the **maximum** range of the SAM, adjust the accuracy rate as follows:

1. If either of these counters is beyond the maximum range, subtract 3 from the accuracy rate.

2. If both of these counters are beyond the maximum range, subtract 6 from the accuracy rate. Bear in mind that unless some point on the target's flight path for that phase is within maximum range of the SAM, the weapon cannot be fired.

e. Normally, SAM's are controlled by an FC radar. However, when a SAM is controlled solely by an optical director sight, subtract 2 from the accuracy rate.

f. If an SSM is homing in on its target during the phase of firing measure the distance between the last and second from the last SSM counter and adjust accuracy as follows:

1. If the distance is greater than two-thirds of the SSM's normal speed, there is no adjustment.

2. If the distance is greater than one-third but less than or equal to two-thirds of the SSM's normal speed, subtract 5 from the accuracy rate.

3. If the distance is less than or equal to one-third of the SSM's speed, subtract 10 from the accuracy rate.

g. If the SAM battery shoots down its target, it may immediately fire a another aerial target. When firing at an additional target, follow th rules in 22,i above.

24. EFFECTS OF ACCURACY ADJUSTMENTS:

a. Only gunnery adjustments apply to gunfire; only SAM adjustment apply to SAM's.

b. All adjustments are cumulative.

c. If, after adjustments, the accuracy rate of the weapon exceeds 18 use the 18 column on the AA Table to determine results.

d. If, after all adjustments, the accuracy rate of the weapon is less tha 1, use the 1 column on the AA Table to determine results.

Exception: If a battery fires at more than one target during a phase, n firing is possible against targets other than the initial target when th accuracy rate is less than 1. When fire is shifted, the accuracy rat against the new target must always be 1 or higher or firing is no permitted.

25. LONG RANGE SAM'S:

a. One SAM, the Talos, can fly for more than one phase. This missi can be fired if the normal requirements are met. If the range betwee the firer and the target at the time of launch is less than or equal to th SAM's speed, follow the normal procedures.

b. If the range exceeds the SAM's speed, the target cannot be hit b the SAM during the phase of launch. The launching player must plac a SAM marker at a distance from the firing unit equal to the speed o the SAM in the direction of launch.

h. All frigates have one propeller.

i. The Knox class frigates have only one large engine room which makes them particularly susceptible to engine damage and heavy flooding. To simulate this, do as follows:

1. Double all engine damage. **Example:** If a ship would normally lose 5 kts, a Knox class will lose 10 kts.

2. Whenever a damage result calls for both flooding and engine damage to a Knox class, double the amount of flooding damage. **Example:** If the flooding would normally call for 100 points of flotation damage, the Knox will sustain 200 points. This increase in flooding only occurs when the damage result line also indicates engine damage; do not increase the flooding if no engine damage was caused by the hit.

j. Ships of the Forrest-Sherman class have been refitted in several different ways. There are actually three types of Forrest-Sherman class destroyers. The first type is the unmodified Forrest-Sherman given in the table above. Another type is the ASW Forrest-Sherman. This type is the same as the unmodified version except that one 5" gun mount has been removed from the stern and replaced by an ASROC launcher, and the two twin torpedo mounts were replaced by two triple mounts. In addition, radar #4 was replaced by radar #6, and sonar #12 was added. The third type of Forrest-Sherman is similar to the ASW Forrest-Sherman but with the following exceptions:

1. The 5" gun mounted aft has been removed; these ships therefore carry only one 5" gun. In place of it, a Tartar SAM launcher has been installed. This launcher is capable of firing both Tartars and Standards.

2. All but one of these ships carry radar #4 rather than radar #6. In addition, all carry one SPS-48 (radar #8), and one SPG-51 (#72). The SPG-35 (#69) has been removed from all ships.

3. These vessels carry only sonar #5; they do not carry sonar #12 in addition to it.

k. The Kitty Hawk, Nimitz, and Enterprise classes have decks and hulls of high tension steel that acts as armor protection. The entire hull areas of these ships are protected, so no hull damage at all is possible by gunfire unless the armor can be penetrated.

l. The 20mm guns on the Tarawa class do not require a fire control radar; they are only capable of firing by local control.

m. All US carriers except the Midway and Tarawa classes have four elevators. The Midway class has three elevators; the Tarawa has two.

n. All US torpedo tubes are armed solely with the Mk 46 ASW torpedo.

o. The chaff launchers on US ships are short-range chaff launchers. Apparently, US ships do not carry chaff shells for their guns.

p. Most US ships other than aircraft carriers are equipped with blip enhancers.

NOTES ON THE BRITISH NAVY:

1. There are three different models of the 4.5" gun (Marks 5, 6 and 8), and each has somewhat different characteristics. The ranges and accuracy rates of the different models are given on the Gunnery Data Table. The types of 4.5" gun carried on each class of ship are as follows:

a. Mark 5--Tribal
b. Mark 6--County, Leander, Rothesay
c. Mark 8--Bristol, Sheffield, Amazon

2. The 20mm guns found on most ships and the 40mm guns found on the Weapons and Leander classes may only fire by local control. The 40mm gun is the same as the Italian-made 40mm gun appearing on the Gunnery Data Table.

3. Aircraft:

a. The Ark Royal normally carried the following aircraft:
1. Twelve F-4's
2. Fourteen Buccaneers
3. Four Gannets
4. Seven Sea Kings
5. Two Wessex

b. The Hermes can carry twenty-four helicopters of any type.

c. The Invincible can carry a total of fifteen aircraft. Of these, up to nine may be Harriers; all of the rest must be helicopters.

d. All other ships listed as carrying aircraft may only carry helicopters. The type of helicopter normally carried on each ship is as follows:
1. Tiger--Sea King
2. Bristol, Leander, Rothesay, Tribal--Wasp
3. County--Wessex
4. Amazon, Weapons--Lynx
5. Sheffield--Lynx or Wasp

4. The Seawolf SAM system is completely automated. It may fire at targets which have not yet been detected by the firing unit.

5. Two Tribal class frigates carry the Type 199 sonar in addition to the Type 177.

6. Some Leanders have no Type 199 sonar. Others have two 40mm guns in place of the Seacat launchers.

7. All British aircraft carriers have two elevators.

8. The chaff launchers on British ships are short range.

9. All British torpedo tubes are armed solely with the Mk 46 ASW torpedo.

10. Modernization:

a. The STIR radar (radar #24) will replace the Type 965 radar on the Invincible class.

b. Seawolf will replace the Seacat launchers on the Amazon and Leander classes.

c. Exocets will be fitted to the Amazon class.

11. British data link cannot normally be tied into US data link. However, the HMS Bristol is capable of receiving and transmitting information by both types of data link.

NOTES ON THE SOVIET NAVY:

1. There are two different types of 57mm gun in the Soviet Navy: the 57mm/70 and the 57mm/80. The 57mm/70 is found on the Skory Mod, Krupny, Kildin, and Kanin classes, while the 57mm/80 is found on the Moskva, Kresta I, Kresta II, Grisha, and Nanuchka classes.

2. There are two models of 30mm gun; the normal 30mm gun and the 30mm gatling. Only the Kresta II carries the 30mm gatling. The gatling may only fire at aircraft and missiles, never at ships, and it must always be radar controlled. Local control fire is not capable with the 30mm gatling. The 30mm gatling is fully automatic.

3. The 23mm guns found on the Kiev, Kara, and Kashin Mod classes are gatlings. These are fully automatic guns which are capable of firing only at aircraft and missiles, and they must always be radar controlled.

4. There are two basic types of Soviet ASW rocket launchers: the MBU-2500 and the MBU-4500. These are abbreviated on the table above as M25 and M45 respectively. There are actually two different models of each of these launchers. The MBU-2500 is found on the Kildin, Krupny, Petya, Skory Mod, Riga, and some Kotlin SAM's. The MBU-2500A is found on the Kiev, Moskva, Kynda, Kresta I and II, Kara, Kotlin SAM, Kotlin, Kashin, Kashin Mod, Krivak, Kanin, Petya II Mirka, and Grisha classes.

The MBU-4500 is found only on some Kotlins. The MBU-4500A is found on Kresta I and II, Kara, and some Kashins.

5. The Sverdlov class cruisers carry a tertiary gun battery of thirty-two 37mm guns in twin mounts (i.e., 16Dx37mm) in addition to the guns indicated in the table above. One of these mounts will be knocked out whenever the damage results call for damage to either a main or a secondary ASW mount. These mounts have an FC rating of H.

6. Many of the Sverdlov class have been greatly modified. Two ships carry a Big Net radar (#44) in place of the Knife Rest (#53) and in addition, they carry a Spoon Rest (#63) radar. However, eight of the 37mm guns were removed to allow space for these radars.

Two ships carry a Top Trough radar (#68) in place of the Slim Net (#59).

c. During the gunnery segment of the following phase, determine if the target is still tracked by the SAM's FC radar. If not, the SAM is immediately removed from play. If the target is tracked, determine if the distance between the SAM marker and the last target counter is less than or equal to the maximum range of the SAM minus its speed (for the Talos, this distance is 95" since the maximum range of this SAM is 195" and its speed is 100"). If the distance between the SAM marker and the target is less than or equal to the range of the SAM minus its speed, the SAM may hit its target; otherwise, it automatically misses its target.

d. If the SAM may hit its target during the phase after launch, determine the accuracy rate of the SAM in the normal manner, adjusting the accuracy rate based on the situations that exist during the current phase rather than those that existed during the phase of launch. Also, subtract an additional 5 from the accuracy rate. Then, roll a decimal die and consult the AA Table in the normal manner to determine if the SAM hits its target.

e. The firing player may not change the target of the SAM while the SAM is flying. Thus, if a SAM flies for more than one phase, the target during the second phase of flight must be the same unit that was the target during the first phase.

f. A battery may not fire again while the SAM is flying or the missile already in flight automatically misses its target. Thus, if a SAM is still flying during the phase after launch, and during that phase the same battery is fired again, the SAM launched during the prior phase automatically misses.

26. DETERMINING IF THE SSM HITS ITS TARGET:
If the SSM is not defeated by ECM or shot down, determine if the SSM hits the target during the SSM segment of the combat phase. To do this, roll one decimal die for each SSM homing in. If the number rolled is less than or equal to the missile's accuracy rate as given on the SSM Data Table, the missile hits the target; if the number rolled exceeds the accuracy rate, the missile misses its target and is removed from play immediately. If a 0 is rolled, it is considered to be a roll of 10. If one or more missiles hit their targets, immediately determine the damage caused by the hit in accordance with Rule 27.

27. DETERMINING SSM DAMAGE:
If an SSM hits its target, roll one decimal die and consult the proper SSM Damage Table to determine the results. There are a number of SSM Damage Tables, as damage is based on the size of the target, the size of the missile and whether the missile flew at surface skimming altitude or a higher altitude level. Use the surface skimmer tables for surface skimming missiles, use the high angle tables for all other missiles. Determine the table that fits the situation and consult that table using the number rolled to determine the damage. The damage must be sustained immediately. Roll once for each missile hit.

Exception: Although the Harpoon and Otomat are surface skimming missiles, they will cause damage as if they came in from a high altitude, so use the high altitude tables when Harpoons or Otomats hit a target.

28. SPECIAL SSM:
a. SS-N-10/14 carries either a nuclear depth charge or homing torpedo. Both of these weapons can be used against surface targets. The player must indicate secretly in writing at the start of the game the type of warhead being used on each missile. The effects of nuclear depth charges will be found in the Anti-submarine section of the rules.

b. If torpedoes are used, they may be set for either acoustic homing or non-homing. Acoustic homing torpedoes may be set for straight running or pattern running. The launching player must record in writing at the time of launch if the torpedoes are set for acoustic or non-acoustic homing, and if they are set for acoustic homing, he must also indicate if they are set for straight running or pattern running.

c. Before SS-N-10/14's can be launched, the target must be tracked by the proper radar. There are only two radars capable of tracking targets for the SS-N-10/14: the Eye Bowl radar found on the Krivak class, and the Head Light found on the Kresta II and Kara class cruisers and the Kiev and Moskva class carriers. When a Head Light radar is used to track a target for an SS-N-10/14, it will operate in a pulse doppler mode rather than the normal continuous wave mode. Head Light radars cannot track both surface and air targets during the same phase.

d. At the time of launch, the launching player must indicate in writing the point at which he wishes the missiles to release their payloads (either torpedoes or depth charges). To do this, he must merely indicate the distance in inches from the first SSM counter that he wants the payloads released. Each missile may be set to release its payload at different points if desired. If the missiles carry acoustic homing torpedoes, no more than one torpedo may be released within 8" of any other torpedo; i.e., there may be no more than two torpedoes within 8" of each other. All payloads must be set to be released within 15" of the position of the target at the time of launch.

e. SS-N-10/14's are launched and moved just as normal SSM's. They are subject to being shot down in flight just like other SSM's. During the phase in which the missile reaches the point at which it is to release its payload, the last SSM counter will be placed at that point, and in addition, a torpedo or depth charge counter will be placed beneath that SSM counter. During the subsequent combat phase, the missile will be treated as if it is homing in. It may be fired upon in the normal manner during that phase, but when determining accuracy rates, the missile is assumed to have moved its full speed during that phase, even if the distance between the last and second from the last SSM counter is less than this distance. **Example:** If a missile with a normal speed of 30" per phase releases its payload at a point that is only 20" away from the second from the last SSM counter, the missile's speed is assumed to be 30", not 20", when determining accuracy rates of weapons firing against it. During the SSM segment of the phase in which the SS-N-10/14 is considered to be homing (i.e., the combat phase after the phase in which the warhead is released), the SSM counters are removed. During the torpedo segment of that phase, if the payload is a nuclear depth charge, determine if it causes any damage in accordance with the nuclear depth charge rules found in the anti-submarine section. If the payload is a torpedo, it is not capable of hitting any targets during that phase, but it may be moved in accordance with the normal torpedo movement rules. Thereafter, the torpedo will follow the normal torpedo rules. To determine the size of the torpedo's area of coverage and base accuracy rate, treat the point at which the torpedo enters the water as the point of launch. All torpedoes delivered by SS-N-10/14's are considered to be set to run a wide pattern.

f. The SS-N-10/14 is capable of mid-course correction in flight. If a vessel tracks the target with an Eye Bowl or Head Lights radar during the SSM segment of a combat phase while a missile is flying, the missile may be turned and, in addition, new target information may be programmed into the missile. The point at which the missile is to release its payload may be changed, and in addition, the missile may be directed at a new target if that target is being tracked. However, in order to pass the new information to the missile, the tracking vessel or a unit connected with the tracker by data link must be able to transmit the information to the missile by radio (see the mid-course guidance rules given in 8,b above for additional information).

g. If an SS-N-10/14 carrying a torpedo is shot down, the torpedo cannot function. If an SS-N-10/14 carrying a nuclear depth charge is shot down, assume the depth charge is released at the point occupied by the last SSM counter; it will explode at that point during the torpedo segment of the phase.

h. SS-N-10/14's are not susceptible to ECM, although the tracking radar can be jammed. If the tracking radar is jammed, mid-course correction is not possible, but in all other respects, the missile is not affected.

29. SSM'S AND ARMOR:
a. Whenever any SSM except Otomat, Sea Killer, and Penguin hits a target having deck armor, reduce engine damage and flooding by one level. **Example:** Moderate engine damage will become minor engine damage; heavy flooding will become normal flooding.

b. Whenever an Otomat, Sea Killer, or Penguin hits an armored target, there will be no reduction in damage. These missiles will cause the same level of damage to armored targets as they do to unarmored targets.

30. SSM DAMAGE TO AIRCRAFT CARRIERS:
In addition to the normal damage indicated on the SSM Damage Tables, aircraft carriers will also sustain the following damage:

a. Damage to aircraft: Aircraft will be destroyed as follows:

1. If the carrier has over seventy-five planes on board, it will lose sixteen aircraft if hit by a large missile, eight aircraft if hit by a medium missile, or four aircraft if hit by a small missile.

2. If the carrier has between fifty-one and seventy-five planes on board, it will lose twelve aircraft if hit by a large missile, six if hit by a medium missile, or three if hit by a small missile.

3. If the carrier has between twenty-six and fifty planes, it will lose eight to a large missile, four to a medium missile or two to a small missile.

4. If the carrier has twenty-five or fewer planes, it will lose four to a large missile, two to a medium missile, or one to a small missile.

b. For every three aircraft destroyed, the carrier will sustain a level one fire. Round the fire upward to the nearest level if the number of aircraft destroyed is not equally divisible by three.

c. Whenever Harpoon, Otomat or any high angle missile hits an aircraft carrier, the carrier will sustain flight deck damage equal to the missile's FD rating unless the missile is a dud. If it is a dud, the carrier will sustain flight deck damage equal to 25% of the missile's FD rating. Unlike with gunfire damage, there will be no increased damage if aircraft are also destroyed.

Surface skimming missiles (other than Harpoon and Otomat) will also cause flight deck damage as above, but only if the number picked when consulting the SSM Damage Table is 1, 2, or 3.

See the Damage rules to determine the effects of flight deck damage.

31. SSM DAMAGE TO TANKERS AND OILERS:
a. If tankers or oilers are hit by SSM's, the following additional damage will be sustained:

1. Large Missile - Fire Level 16
2. Medium missile - Fire level 8
3. Small missile - Fire level 4

32. SSM DAMAGE TO SHIPS WITH POOR SHOCK MOUNTINGS:
The Ship Characteristics Table indicates ships which have poor shock mountings. If such a ship sustains an SSM hit, in addition to sustaining normal damage, look at the damage indicated for the number that is one higher than the number actually rolled when consulting the SSM Damage Table. If that result calls for engine damage or electronics damage, the ship will sustain that engine or electronics damage in addition to its normal damage.

Exception: If the normal damage calls for engine damage and the number that is one higher than the number actually rolled also indicates engine damage, the ship will sustain only the engine damage of greater severity, not both.

33. SSM RELOADING:
Currently, only the Soviet Kynda and Kiev classes carry reloads for their SSM's. The Kyndas carry one set of reloads, the Kievs carry one or two. Reloading is carried out during the combat phase. It takes five consecutive combat phases to reload one tube on each mount. During the phases in which a mount is being reloaded, the entire mount may not be fired. Should the reloading of a tube be stoped before it is completed, i.e., before five consecutive combat phases are completed, the reloading process must begin all over again; the ship will lose the benefit for the combat phases in which reloading of that tube was begun but not completed. More than one mount may be reloaded at the same time, at the same rate.

Example: If a ship has two mounts, each mount may have one tube being reloaded at the same time. After five consecutive combat phases, both mounts will each have one reloaded tube.

NATO Harpoon mounts are capable of being reloaded in a similar manner, but currently it seems that no ship carries reloads. Other NATO SSM mounts are not capable of being reloaded except at port.

34. USING SAM'S AS SSM'S:
a. Some SAM's are dual purpose and can be used against surface targets as well as aircraft. When SAM's are used in this manner, follow the normal SSM procedures. The SAM's which can be used as SSM's are listed on the SSM Data Table. As indicated there, all such SAM's are semi-active and when used as SSM's, SAM's have a very large minimum range. They are launched, move, and home in during the SSM segments of the combat phases, just as if they were SSM's.

b. Unlike normal SSM's, the speed of a SAM always exceeds its maximum range. SAM's will therefore be launched during one phase and will home in on their targets during the following combat phase. Since the SAM's are semi-active homing, the target must be tracked by the SAM's FC radar both during the phase of launch and the following phase; if radar tracking is broken, the SAM's will miss the target.

c. When a SAM having an FD rating of over 100 scores a hit, always consult the "Small" SSM damage tables regardless of the size indicated for the SAM. If the SAM's FD rating is 100, consult the Deck damage portion of the Gunnery Damage Chart in order to determine damage; the SSM Damage Tables are not used in this case.

d. When SAM's are used as SSM's, they can be engaged by gunnery and other SAM's just as normal SSM's. SAM's used against air targets are not susceptible to AA fire of any kind.

e. Each SAM battery may fire a maximum of two SAM's at a surface target during each phase. A SAM battery may not fire at surface targets if it fired on aircraft or missiles during the same phase. Each SAM battery may engage only one surface target at a time.

CHARTS AND TABLES

COLLISION DAMAGE CHART

A. DAMAGE TO THE SHIP COLLIDED WITH:
Situation 3
Number rolled - Result
1 - 2 = Minor flooding
3 - 5 = Moderate flooding
6 = Moderate flooding, Fire Level 2
7 = Moderate flooding, electronics damage
8 = Moderate flooding, moderate engine damage, severe electronics damage.
9 = Heavy flooding, one generator KO, major engine damage, very severe electronics damage.
10 = Heavy flooding, two generator KO, very severe engine damage, very severe electronics damage.

Situation 2
Number rolled - Result
1 - 7 = Minor flooding
8 = Moderate flooding, electronics damage.
9 = Moderate flooding, minor engine damage, electronics damage.
10 = Moderate flooding, moderate engine damage, severe electronics damage, one generator KO.

Situation 1
Number rolled - Result
1 - 2 = Moderate Flooding
3 = Heavy flooding, fire level 2
4 - 5 = Heavy flooding, severe electronics damage.
6 = Heavy flooding, severe electronics damage, moderate engine damage.
7 = Heavy flooding, one generator KO, major engine damage, very severe electronics damage.
8 - 10 = Very heavy flooding, two generators KO, very severe engine damage, very severe electronics damage.

B. DAMAGE TO THE SHIP CAUSING THE COLLISION:
Situation 3
Number rolled - Result
1 - 5 = Minor flooding
6 - 7 = Minor flooding, bow-mounted sonar KO, electronics damage.
8 = Moderate flooding, bow-mounted sonar KO, fire level 2, minor engine damage, severe electronics damage, one generator KO.
9 = Moderate flooding, bow-mounted sonar KO, moderate engine damage, severe electronics damage, one generator KO.
10 = Heavy flooding, bow-mounted sonar KO, major damage, two generators KO, very severe electronics damage.

Situation 2
Number rolled - Result
1 - 2 = Minor flooding
3 - 4 = Minor flooding, bow-mounted sonar KO, electronics damage.
5 - 6 = Moderate flooding, bow-mounted sonar KO, electronics damage.
7 - 8 = Moderate flooding, bow-mounted sonar KO, fire level 2, moderate engine damage, severe electronics damage, one generator KO.
9 - 10 = Heavy flooding, bow-mounted sonar KO, major engine damage, two generators KO, very severe electronics damage.

Situation 1
Number rolled - Result
1 - 5 = No damage
6 - 7 = Minor flooding
8 - 9 = Minor flooding, bow-mounted sonar KO, electronics damage.
10 = Moderate flooding, bow-mounted sonar KO, severe electronics damage, one generator KO, minor engine damage.

GUNNERY DATA TABLE

Gun	Maker	Range Surface	Range AA	Accuracy Table Surface	Accuracy Table AA	Manual Override
8"/55	US	60"	--	1	--	N
5"/54	US	36"	18"	2	11	Y
5"/38	US	28"	14"	3	10	Y
3"/50	US	20"	12"	4	8	Y
20mm Vul	US	--	3"	--	2	N
6"	GB	36"	14"	4	10	N
4.5"/MK 6	GB	36"	18"	2	11	Y
4.5"/MK 8	GB	36"	18"	5	12	N
4.5"/MK 5	GB	28"	14"	3	10	Y
4"/45	GB	28"	14"	13	10	Y
3"/70	GB	27"	15"	2	9	N
30mm	GB	8"	7"	9	3	N
20mm	GB	6"	3"	16	1	N
5"/54	Fr	36"	18"	2	11	Y
100mm/55	Fr	24"	12"	6	7	N
57mm/60	Fr	24"	12"	7	6	N
30mm	Fr	8"	7"	9	3	N
5"/54	It	40"	18"	6	12	N
76mm/62	It	24"	12"	6	7	N
40mm/70	It	18"	10"	8	4	N
35mm/90	It	9"	7"	7	3	N
23mm Gatl	USSR	--	3"	--	13	N
23-25mm	USSR	6"	3"	16	14	N
30mm Gatl	USSR	--	4"	--	15	N
30mm	USSR	8"	4"	9	16	N
37mm	USSR	12"	6"	10	17	N
45mm	USSR	12"	6"	9	18	N
57mm/70	USSR	12"	7"	9	19	N
57mm/80	USSR	15"	8"	9	20	N
76mm/60	USSR	24"	12"	11	21	N
85mm/52	USSR	16"	8"	12	22	Y
100mm/60	USSR	28"	14"	13	23	Y
130mm	USSR	40"	21"	14	24	Y
152mm/50	USSR	40"	--	15	--	Y

Notes: Most of the table above is self-explanatory. The ranges are the maximum ranges of the guns; the surface range is the maximum range against ships, the AA range is the maximum range against aircraft and missiles. The Accuracy Table column indicates where the base accuracy rates and accuracy tables can be found for each weapon. The number in the Surface portion of that column refers to the numbers appearing next to the Gunnery Firing Tables, Gunnery Accuracy Tables and Area Hit Tables; use the tables having the same number as the number appearing in the Accuracy Table, Surface column when firing the weapon at surface targets. The number in the AA portion of that column refers to the line on the AA Table; when firing the weapon at air targets, use the accuracy rates and other information on the line of the AA Table having the same number as the number which appears in the AA portion of the column. **Example:** If a US 5"/54 is fired at surface targets, use Gunnery Firing Table, Gunnery Accuracy Table, and Area Hit Table number 2 in order to determine the results of the firing. If the weapon is fired at an air target, use line number 11 on the AA Table to determine results. Each Gunnery Table and line on the AA Table is identified by both a number and the designation of a weapon. However, frequently, the Table or line does not bear the designations of all of the weapons it is used for. Therefore, the fact that the designation of the weapon being used does not appear on the table is unimportant; the ID number on the table is all that really matters.

Manual Override: If a Y appears, the weapon is capable of manual override; if an N appears the weapon is not capable of manual override.

All weapons having an FC rating of A cannot be used against surface ships. Also, they may not be used against air targets unless the target is tracked by the proper FC radar. Any weapon listed above which has no entry in the Surface range column may not be fired against surface targets; any weapon having no entry in the AA range column may not be fired against air targets.

The US 5"/54 MK 45 found that the Spruance, Virginia, California and Tarawa classes cannot fire at targets above very low altitude. Also, these weapons are not capable of manual override or fire by local control. Similarly, the US 8"/55 is not capable of firing by local control or without its FC radar.

GUNNERY RESULTS CHART

I. Gunnery Accuracy Rate Adjustments (Accuracy Adjustment Table)

1. Target size:

a. Over 10,000 tons	+1
b. Under 1,000 tons	-2

2. Target speed:

a. 0 kts	+3
b. 1-10 kts	+2
c. 11-20 kts	+1
d. 40-59 kts	-1
e. 60-79 kts	-2
f. 80 kts +	-3

3. Turning:

a. Target turned 46-90°	-1
b. Target turned 91° or more	-2
c. Target moved evasively	-2
d. Target made an emergency turn	-1 in addition to above.
e. Firer turned 46-90°	-1 if FC rating is F, G, H.
f. Firer turned 91° or more	-1 if FC rating is C,D,E; -2 if FC rating is F,G,H.
g. Firer moved evasively	-1 if FC rating is C,D,E; -2 if FC rating is F,G,H.
h. Firer made an emergency turn	-1 in addition to above unless FC rating is A, or B.

4. Ranging in:

a. FC rating--A,B	-1
b. FC rating--C,D,E	-2
c. FC rating--F,G,H	-3
d. FC radar not used	-1 in addition to above.
e. Firer is Soviet design	-1 in addition to above.

5. Range Finder:

a. FC radar	No adjustment
b. TWS radar	-1
c. Search radar	-2
d. Gun director	-3
e. Local control	FC rating reduced to H

6. Capping the T -1

II. Gunnery Results Tables:

1. 8"/55 (US)

1,a. GUNNERY ACCURACY TABLE (8"/55)

FC Rating	Range To 15"	16"-30"	31"-45"	46"-60"
A	12	10	6	4
B	12	9	5	4
C	11	8	4	3
D	10	7	3	2
E	9	6	2	1
F	6	4	2	1
G	5	3	1	-
H	3	1	-	-

1,b. GUNNERY FIRING TABLE (8"/55)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1											2	4
2							2	2	2	2	4	6
3						2	2	2	4	4	6	10
4					2	2	2	4	4	6	8	14
5					2	2	2	4	6	8	10	16
6				2	2	2	4	4	6	8	12	16
7				2	2	2	4	4	8	10	14	18
8			2	2	2	2	4	6	8	12	16	22
9		2	2	2	2	4	4	6	10	14	18	26
0	2	2	2	2	4	4	6	8	12	16	20	28

1,c. AREA HIT TABLE (8"/55)

Area Hit	Range To 15"	16"-30"	31"-45"	46"-60"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

2. 5"/54 & 3"/70

2,a. GUNNERY ACCURACY TABLE (5"/54; 3"/70)

FC Rating	Range To 9" / To 7"	10" - 18" / 8" - 14"	19" - 27" / 15" - 21"	28" - 36" / 22" - 27"	(5"/54) (3"/70)
A	12	10	6	4	
B	12	9	5	4	
C	11	8	4	3	
D	10	7	3	2	
E	9	6	2	1	
F	6	4	2	1	
G	5	3	1	-	
H	3	1	-	-	

2,b. GUNNERY FIRING TABLE (5"/54 & 3"/70)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1					1	1	1	2	4	5	8	12
2					1	1	2	2	4	6	9	13
3				1	1	2	2	3	5	6	10	14
4				1	1	2	3	3	5	7	11	15
5				1	1	2	3	4	6	8	12	16
6			1	1	2	2	3	4	6	8	12	16
7		1	1	1	2	2	3	5	7	9	13	17
8		1	1	1	2	2	4	5	7	10	14	18
9	1	1	1	2	2	3	4	6	8	10	15	19
0	1	1	2	2	2	3	5	6	8	11	16	20

2,c. AREA HIT TABLE (5"/54 & 3"/70)

Area Hit	Range To 9" / To 7"	10"-18" / 8"-14"	19"-27" / 15"-21"	28"-36" / 22"-27"	(5"/54) (3"/70)
Hull	1-4	1-4	1-2	1-2	
S/S*	5-9	5-8	3-6	3-5	
Deck	10	9-10	7-10	6-10	

S/S* = Superstructure

The Fr. 5"/54 and the Br. 4.5"/MK 6 perform exactly as the US 5"/54.

3. 5"/38 & 4.5"/MK 5

3,a. GUNNERY ACCURACY TABLE (5"/38 & 4.5"/MK 5)

FC Rating	Range To 7"	8"-14"	15"-21"	22"-28"
A	12	10	6	4
B	12	9	5	4
C	11	8	4	3
D	10	7	3	2
E	9	6	2	1
F	6	4	2	1
G	5	3	1	-
H	3	1	-	-

3,b. GUNNERY FIRING TABLE (5"/38 & 4.5"/MK 5)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1								1	1	1	3	4
2							1	1	2	2	4	5
3							1	1	2	3	4	5
4						1	1	2	2	3	5	6
5					1	1	1	2	3	3	5	7
6					1	1	1	2	3	4	5	8
7				1	1	1	2	2	3	4	6	8
8			1	1	1	1	2	2	3	5	6	9
9		1	1	1	1	2	2	2	4	5	7	9
0	1	1	1	1	2	2	2	3	4	6	8	10

3,c. AREA HIT TABLE (5"/38 & 4.5"/MK 5)

Area Hit	Range To 7"	8"-14"	15"-21"	22"-28"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

4. 3"/50 & 6"

4,a. GUNNERY ACCURACY TABLE (3"/50 & 6")

FC Rating	Range To 5" / To 9"	6"-10" / 10"-18"	11"-15" / 19"-27"	16"-20" / 28"-36"	(3"/50) (6")
A	12	10	6	4	
B	12	9	5	4	
C	11	8	4	3	
D	10	7	3	2	
E	9	6	2	1	
F	6	4	2	1	
G	5	3	1	-	
H	3	1	-	-	

4,b. GUNNERY FIRING TABLE (3"/50 & 6")

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1							1	1	1	2	4	5
2							1	1	2	2	4	6
3						1	1	2	2	3	5	6
4						1	1	2	3	3	5	7
5					1	1	1	2	3	4	6	8
6					1	1	2	2	3	4	6	8
7				1	1	1	2	2	3	5	7	9
8			1	1	1	1	2	2	4	5	7	10
9		1	1	1	2	2	2	3	4	6	8	10
0	1	1	1	2	2	2	2	3	5	6	8	11

4,c. AREA HIT TABLE (3"/50 &6")

Area Hit	Range To 5" / To 9"	6"-10" / 10"-18"	11"-15" / 19"-27"	16"-20" / 28"-36"	(3"/50) (6")
Hull	1-4	1-4	1-2	1-2	
S/S*	5-9	5-8	3-6	3-5	
Deck	10	9-10	7-10	6-10	

S/S* = Superstructure

5. 4.5"/MK 8

5,a. GUNNERY ACCURACY TABLE (4.5"/MK 8)

FC Rating	Range To 9"	10"-18"	19"-27"	28"-36"
A	12	10	6	4
B	12	9	5	4
C	11	8	4	3
D	10	7	3	2
E	9	6	2	1
F	6	4	2	1
G	5	3	1	-
H	3	1	-	-

5,b. GUNNERY FIRING TABLE (4.5"/MK 8)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1				1	1	1	2	4	5	8	10	18
2				1	2	2	3	4	6	9	12	20
3				1	2	2	3	5	7	10	14	22
4			1	1	2	3	4	5	8	11	16	23
5			1	1	2	3	4	6	9	12	18	24
6		1	1	2	2	3	5	6	9	12	18	24
7		1	1	2	2	3	5	7	10	13	20	25
8	1	1	1	2	2	4	6	7	11	14	22	26
9	1	1	2	2	3	4	6	8	12	15	24	28
0	1	2	2	2	3	5	7	8	13	16	26	30

5,c. AREA HIT TABLE (4.5"/MK 8)

Area Hit	Range To 9"	10"-18"	19"-27"	28"-36"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

6. 76mm/62 & 5"/54 (OTO-Melara)

6,a. GUNNERY ACCURACY TABLE (76mm/62 & 5"/54)

FC Rating	Range To 6" / To 10"	7"-12" / 11"-20"	13"-18" / 21"-30"	19"-24" / 31"-40"	(76mm/62) (5"/54)
A	12	10	6	4	
B	12	9	5	4	
C	11	8	4	3	
D	10	7	3	2	
E	9	6	2	1	
F	6	4	2	1	
G	5	3	1	-	
H	3	1	-	-	

6,b. GUNNERY FIRING TABLE (76mm/62 & 5"/54)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1				1	1	2	3	4	6	8	12	24
2				1	2	2	4	5	8	10	15	26
3			1	1	2	3	5	6	10	12	18	28
4			1	2	3	3	5	7	10	14	21	30
5		1	1	2	3	4	6	8	12	16	24	32
6		1	1	2	3	4	6	8	12	16	24	32
7	1	1	1	2	3	5	7	9	14	18	27	34
8	1	1	2	3	4	5	7	10	14	20	30	36
9	1	2	2	3	4	6	8	11	16	22	33	38
0	1	2	3	3	5	6	9	12	18	24	36	40

6,c. AREA HIT TABLE (76mm/62 & 5"/54)

Area Hit	Range To 6" / To 10"	7"-12" / 11"-20"	13"-18" / 21"-30"	19"-24" / 31"-40"	(76mm/62) (5"/54)
Hull	1-4	1-4	1-2	1-2	
S/S*	5-9	5-8	3-6	3-5	
Deck	10	9-10	7-10	6-10	

S/S* = Superstructure

The Fr 100mm/55 performs exactly the same as the 76mm/62.

7. 57mm/60 & 35mm/90

7,a. GUNNERY ACCURACY TABLE (57mm/60 & 35mm/90)

FC Rating	Range To 6" / To 2"	7"-12" / 3"- 4"	13"-18" / 5"- 6"	19"-24" / 7"- 9"	(57mm/60) (35mm/90)
A	12	10	6	4	
B	12	9	5	4	
C	11	8	4	3	
D	10	7	3	2	
E	9	6	2	1	
F	6	4	2	1	
G	5	3	1	-	
H	3	1	-	-	

7,a. GUNNERY FIRING TABLE (57mm/60 & 35mm/90)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1			1	1	2	3	3	4	7	12	18	30
2			1	1	2	3	4	6	9	14	21	31
3		1	1	2	2	4	5	7	11	16	24	34
4		1	1	2	3	4	6	9	13	18	27	37
5		1	1	2	4	5	7	10	15	20	30	40
6	1	1	1	3	4	5	8	10	15	20	30	40
7	1	1	2	3	4	6	9	11	17	22	33	43
8	1	1	2	3	5	6	10	13	19	24	36	46
9	1	2	2	4	5	7	11	14	21	26	39	49
0	1	2	3	4	6	7	12	16	23	28	42	50

7,c. AREA HIT TABLE (57mm/60 & 35mm/90)

Area Hit	Range To 6" / To 2"	7"-12" / 3"- 4"	13"-18" / 5"- 6"	19"-24" / 7"- 9"	(57mm/60) (35mm/90)
Hull	1-4	1-4	1-2	1-2	
S/S*	5-9	5-8	3-6	3-5	
Deck	10	9-10	7-10	6-10	

S/S* = Superstructure

8. 40mm/70

8,a. GUNNERY ACCURACY TABLE (40mm/70)

FC Rating	Range To 4"	5"-9"	10"-13"	14"-18"
A	12	10	6	4
B	12	9	5	4
C	11	8	4	3
D	10	7	3	2
E	9	6	2	1
F	6	4	2	1
G	5	3	1	-
H	3	1	-	-

8,b. GUNNERY FIRING TABLE (40mm/70)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1					1	1	1	2	4	5	8	12
2					1	1	2	2	4	6	9	13
3				1	1	2	2	3	5	6	10	14
4				1	1	2	3	3	5	7	11	15
5				1	1	2	3	4	6	8	12	16
6			1	1	2	2	3	4	6	8	12	16
7		1	1	1	2	2	3	5	7	9	13	17
8		1	1	1	2	2	4	5	7	10	14	18
9	1	1	1	2	2	3	4	6	8	10	15	19
0	1	1	2	2	2	3	5	6	8	11	16	20

8,c. AREA HIT TABLE (40mm/70)

Area Hit	Range To 4"	5"-9"	10"-13"	14"-18"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

9. 57mm, 45mm, & 30mm

9,a. GUNNERY ACCURACY TABLE (57mm, 45mm, 30mm)

FC Rating	Range To 3" / To 4" / To 2"	4"-6" / 5"-8" / 3"-4"	7"- 9" / 9"-12" / 5"- 6"	10"-12" / 13"-15" / 7"- 8"	(57mm/70 & 45mm) (57mm/80) (30mm)
A	12	10	6	4	
B	12	9	5	4	
C	11	8	4	3	
D	10	7	3	2	
E	9	6	2	1	
F	6	4	2	1	
G	5	3	1	-	
H	3	1	-	-	

9,b. GUNNERY FIRING TABLE (57mm, 45mm, 30mm)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1			1	1	2	3	3	4	7	12	18	30
2			1	1	2	3	4	6	9	14	21	31
3		1	1	2	2	4	5	7	11	16	24	34
4		1	1	2	3	4	6	9	13	18	27	37
5		1	1	2	4	5	7	10	15	20	30	40
6	1	1	1	3	4	5	8	10	15	20	30	40
7	1	1	2	3	4	6	9	11	17	22	33	43
8	1	1	2	3	5	6	10	13	19	24	36	46
9	1	2	2	4	5	7	11	14	21	26	39	49
0	1	2	3	4	6	7	12	16	23	28	42	50

9,c. AREA HIT TABLE (57mm, 45mm, 30mm)

Area Hit	Range To 3" / To 4" / To 2"	4"-6" / 5"-8" / 3"-4"	7"- 9" / 9"-12" / 5"- 6"	10"-12" / 13"-15" / 7"- 8"	(57mm/70, 45mm) (57mm/80) (30mm)
Hull	1-4	1-4	1-2	1-2	
S/S*	5-9	5-8	3-6	3-5	
Deck	10	9-10	7-10	6-10	

S/S* = Superstructure

10. 37mm

10,a. GUNNERY ACCURACY TABLE (37mm)

FC Rating	Range To 3"	4"-6"	7"-9"	10"-12"
A	12	10	6	4
B	12	9	5	4
C	11	8	4	3
D	10	7	3	2
E	9	6	2	1
F	6	4	2	1
G	5	3	1	-
H	3	1	-	-

10,b. GUNNERY FIRING TABLE (37mm)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1					1	1	1	2	4	5	8	12
2					1	1	2	2	4	6	9	13
3				1	1	2	2	3	5	6	10	14
4				1	1	2	3		5	7	11	15
5				1	1	2	3	4	6	8	12	16
6			1	1	2	2	3	4	6	8	12	16
7		1	1	1	2	2	3	5	7	9	13	17
8		1	1	1	2	2	4	5	7	10	14	18
9	1	1	1	2	2	3	4	6	8	10	15	19
0	1	1	2	2	2	3	5	6	8	11	16	20

10,c. AREA HIT TABLE (37mm)

Area Hit	Range To 3"	4"-6"	7"-9"	10"-12"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

11. 76mm/60

11,a. GUNNERY ACCURACY TABLE (76mm/60)

FC Rating	Range To 6"	7"-12"	13"-18"	19"-24"
A	12	10	6	4
B	12	9	5	4
C	11	8	4	3
D	10	7	3	2
E	9	6	2	1
F	6	4	2	1
G	5	3	1	-
H	3	1	-	-

11,b. GUNNERY FIRING TABLE (76mm/60)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1				1	1	2	3	4	6	8	12	24
2				1	2	2	4	5	8	10	15	26
3			1	1	2	3	5	6	10	12	18	28
4			1	2	3	3	5	7	10	14	21	30
5		1	1	2	3	4	6	8	12	16	24	32
6		1	1	2	3	4	6	8	12	16	24	32
7	1	1	1	2	3	5	7	9	14	18	27	34
8	1	1	2	3	4	5	7	10	14	20	30	36
9	1	2	2	3	4	6	8	11	16	22	33	38
0	1	2	3	3	5	6	9	12	18	24	36	40

11,c. AREA HIT TABLE (76mm/60)

Area Hit	Range To 6"	7"-12"	13"-18"	19"-24"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

12. 85mm/52

12,a. GUNNERY ACCURACY TABLE (85mm/52)

FC Rating	Range To 4"	5"-8"	9"-12"	13"-16"
A	12	10	6	4
B	12	9	5	4
C	11	8	4	3
D	10	7	3	2
E	9	6	2	1
F	6	4	2	1
G	5	3	1	-
H	3	1	-	-

12,b. GUNNERY FIRING TABLE (85mm/52)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1										1	2	2
2									1	1	2	3
3									1	1	2	3
4									1	1	2	3
5								1	1	1	2	3
6							1	1	1	2	2	3
7						1	1	1	1	2	3	3
8					1	1	1	1	2	2	3	4
9				1	1	1	1	2	2	2	3	4
0	1	1	1	1	1	1	2	2	2	3	3	4

12,c. AREA HIT TABLE (85mm/52)

Area Hit	Range To 4"	5"-8"	9"-12"	13"-16"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

13. 100mm/60 & 4"/45

13,a. GUNNERY ACCURACY TABLE (100mm & 4"/45)

FC Rating	Range To 7"	8"-14"	15"-21"	22"-28"
A	12	10	6	4
B	12	9	5	4
C	11	8	4	3
D	10	7	3	2
E	9	6	2	1
F	6	4	2	1
G	5	3	1	-
H	3	1	-	-

13,b. GUNNERY FIRING TABLE (100mm & 4"/45)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1									1	1	2	2
2								1	1	1	2	3
3							1	1	2	2	3	3
4							1	1	2	2	3	4
5						1	1	1	2	3	4	5
6					1	1	1	2	2	3	4	6
7					1	1	1	2	2	3	5	7
8				1	1	1	1	2	2	3	5	8
9			1	1	1	1	2	2	3	4	6	8
0	1	1	1	1	1	2	2	2	3	4	6	9

13,c. AREA HIT TABLE (100mm & 4"/45)

Area Hit	Range To 7"	8"-14"	15"-21"	22"-28"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

14. 130mm

14,a. GUNNERY ACCURACY TABLE (130mm)

FC Rating	Range To 10"	11"-20"	21"-30"	31"-40"
A	12	10	6	4
B	12	9	5	4
C	11	8	4	3
D	10	7	3	2
E	9	6	2	1
F	6	4	2	1
G	5	3	1	-
H	3	1	-	-

14,b. GUNNERY FIRING TABLE (130mm)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1									1	1	1	2
2									1	1	2	2
3								1	1	1	2	3
4								1	1	2	3	3
5							1	1	1	2	3	4
6							1	1	2	2	3	4
7					1	1	1	1	2	2	3	5
8				1	1	1	1	1	2	3	4	5
9			1	1	1	1	2	2	2	3	4	6
0	1	1	1	1	1	2	2	2	2	3	5	6

14,c. AREA HIT TABLE (130mm)

Area Hit	Range To 10"	11"-20"	21"-30"	31"-40"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

15. 152mm/50

15,a. GUNNERY ACCURACY TABLE (152mm)

FC Rating	Range To 10"	11"-20"	21"-30"	31"-40"
A	12	10	6	4
B	12	9	5	4
C	11	8	4	3
D	10	7	3	2
E	9	6	2	1
F	6	4	2	1
G	5	3	1	-
H	3	1	-	-

15,b. GUNNERY FIRING TABLE (152mm)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1								1	1	1	1	2
2							1	1	2	2	2	3
3							1	1	2	2	2	4
4							1	1	2	3	3	5
5						1	1	1	2	3	4	6
6					1	1	1	2	2	3	5	6
7				1	1	1	1	2	3	3	6	7
8			1	1	1	1	2	2	3	4	7	8
9		1	1	1	1	2	2	2	3	4	7	9
0	1	1	1	1	2	2	2	2	3	5	8	10

15,c. AREA HIT TABLE (152mm)

Area Hit	Range To 10"	11"-20"	21"-30"	31"-40"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

16. 20mm-25mm

16,a. GUNNERY ACCURACY TABLE (20mm-25mm)

FC Rating	Range To 1"	2"-3"	4"	5"-6"
H	3	1	-	-

16,b. GUNNERY FIRING TABLE (20mm-25mm)

Die Roll	Accuracy Rate 1	2	3	4	5	6	7	8	9	10	11	12
1							1	1	3	6	9	15
2					1	1	2	2	4	7	10	17
3				1	1	1	2	3	5	8	11	10
4			1	1	2	2	3	4	6	9	13	19
5			1	1	2	2	3	5	7	10	15	20
6		1	1	2	2	3	4	5	8	10	15	20
7		1	1	2	2	3	4	6	9	11	17	21
8	1	1	1	2	3	4	5	7	10	12	19	22
9	1	1	1	2	3	4	5	8	11	13	20	23
0	1	1	2	2	4	5	6	9	12	14	21	25

16,c. AREA HIT TABLE (20mm-25mm)

Area Hit	Range To 1"	2"-3"	4"	5"-6"
Hull	1-4	1-4	1-2	1-2
S/S*	5-9	5-8	3-6	3-5
Deck	10	9-10	7-10	6-10

S/S* = Superstructure

Note: If the weapon used is a NATO 20mm gun, increase the normal accuracy rate by 2. Thus, the base accuracy rate at less than 1" range is 5 for the NATO gun, and at a range of 2"-3", the base accuracy rate is 3. The NATO weapons may be fired out to 6" range; the base accuracy rate beyond 3" range is 1.

GUNNERY DAMAGE CHART

I. Abbreviations:

KO--Knocked out; equipment which is knocked out will immediately cease functioning.

SAM--Surface to air missile
SSM--Surface to Surface missile
ASW--Anti-submarine weapon
Torp--Torpedo
Sec--Secondary
FC--Fire control
ECM--Electronic Countermeasures
CIC--Combat information center

P--Shell penetration is required to do damage. If a damage result is preceded by a P, high capacity (HC) rounds will cause no damage. P positions are always unarmored.

PA--Armor penetration is required. If a damage result is preceded by PA, HC rounds will cause no damage. In addition, if the target has armor protection on the position, shells unable to penetrate the armor will cause no damage.

A--Armor penetration is required. If the position is armored, HC rounds and shells unable to penetrate the armor will cause no damage. However, if the position is unarmored, all shells, including HC, will cause the damage indicated.

Note: The Ship Characteristics Table indicates which ships are armored, and the thickness of the armor. Most modern ships are unarmored, and on such ships, all ammunition will cause damage preceded by A, while all ammunition except HC will also cause damage preceded by PA and P. Also, if damage is precluded due to the fact that the shell is unable to penetrate the position preceded by PA or P, no damage at all will be caused unless a damage entry appears on the same line in parentheses; only the damage indicated in parentheses can be caused. However, if a position is preceded by A, only the equipment immediately following the A entry can be protected by the armor. Thus, if the damage table indicates "A--1 main gun mount, 1 main gun FC radar KO", the radar will be KO regardless if the shell is capable of penetrating the turret's armor.

If a ship is armored, determine the armor thickness that must be penetrated as follow:

1. If the position is preceded by A, the turret armor must usually be penetrated. **Exception:** If the damage table calls for CIC damage or all FC systems KO, the deck armor must be penetrated.

2. If the damage is preceded by P, the position is unarmored, but HC will cause no damage.

3. If the damage is preceded by PA and the damage is occuring to the deck of the vessel, the deck armor must be penetrated; if the damage is preceded by PA and the damage is occuring to the hull of the vessel, the belt armor must be penetrated.

If a damage entry appears in parentheses, the damage indicated there will be sustained only if the equipment that would normally sustain the damage is either already knocked out (or non-existent on the target vessel), or unable to be damaged because the shells are unable to penetrate.

II. Gunnery Damage Tables.

A. SUPERSTRUCTURE DAMAGE

Number rolled/Result:

1-4: 1 main SAM mount KO
5: 1 surface search radar, 1 main SAM mount KO
6-9: A--1 main gun mount KO
10: A--1 main gun mount, 1 main SAM FC radar KO
11-13: 1 main SAM mount KO
14: 1 SSM FC radar, 1 main SAM mount KO
15: 1 main SAM mount, 1 surface search radar KO
16-17: A--1 main gun mount KO (fire level 1)
18: A--1 main gun mount, 1 SSM FC radar KO
19: A--1 main gun mount KO (1 sec gun mount KO), 1 sec gun FC radar KO
20: A--1 main gun mount, 1 main gun FC radar, 1 air search radar KO.
21-23: 1 SSM mount KO
24: 1 SSM mount, 1 SSM FC radar KO
25: 1 air search radar, 1 SSM mount KO
26-30: 1 main ASW mount KO
31-35: 1 sec weapons mount KO. The firing player may determine the type of mount KO.
36-38: 1 torp bank KO
39: 1 torp bank, 1 air search radar KO
40: 1 sec SAM FC radar, 1 torp bank KO
41-43: Fire level 1
44-45: Fire level 2
46: Fire level 1, 1 sec SAM FC radar KO
47: Fire level 1, 1 ECM launcher (or jammer) KO
48-49: Fire level 3
50: 1 sec gun FC radar KO, fire level 2
51-53: 1 helicopter (or aircraft) KO
54-55: 1 helicopter (or aircraft) KO, fire level 2
56: Vibration--Moderate engine damage and all electronics KO, 1 generator KO. If the target ship is over 10,000 tons, it will sustain the damage indicated by #95 below instead of the above.
57-58: Bridge KO
59-61: Bridge, 1 main SAM FC radar KO
62-63: 1 main gun director KO
64-66: 1 main gun director, 1 main gun FC radar KO
67: Communications and steering circuits KO
68-69: Communications KO
70-72: Communications and data link KO
73-74: Data link KO
75-77: CIC KO if US ship; otherwise, roll again
78-80: 1 ECM launcher (or jammer) KO
81-83: Radar jammer KO
84: 1 air search radar KO
85: 1 main SAM FC radar KO
86: 1 surface search radar KO
87: 1 main gun FC radar KO
88-90: 1 SSM FC radar KO
91: 1 sec SAM FC radar KO (or 1 main SAM FC radar KO)
92: 1 sec gun FC radar KO (1 main gun FC radar KO)
93: 1 air search radar, 1 main SAM FC radar KO
94: 1 sec SAM FC radar, 1 air search radar KO
95: 1 surface search radar, 1 main gun FC radar KO
96: 1 air search radar, 1 surface search radar KO
97: 1 SSM FC radar, 1 surface search radar KO
98: 1 air search radar, 1 SSM FC radar KO
99: 1 sec gun FC radar, 1 surface search radar KO
00: Vibration--all generators KO. If the target ship is over 10,000 tons, 1 main gun FC radar KO instead of the above.

B. DECK DAMAGE

Number rolled/Result:

1-10: No damage
11: 1 air search radar KO
12: 1 surface search radar KO
13: 1 main gun FC radar KO
14: 1 main SAM FC radar KO
15: 1 SSM FC radar KO
16: 1 sec gun FC radar KO
17: 1 sec SAM FC radar KO
18: 1 sec gun FC radar KO, radar detector KO
19: Radar detector KO, 1 main gun FC radar KO
20: 1 generator KO
21-29: Fire level 1
30: Fire level 1, 1 main SAM FC radar KO

31-32: Fire level 3
33: 1 ECM launcher (or jammer) KO
34: Minor engine damage
35-38: PA--Minor engine damage, fire level 1 (same as 11)
39-43: PA--Normal flooding
44: PA--1 generator KO, normal flooding (same as 19)
45-47: PA--Minor engine damage and fire level 1
48-49: PA--Moderate engine damage and fire level 1 (same as 12)
50: PA--Moderate engine damage and fire level 1, 1 generator KO
51: PA--Major engine damage and fire level 1, 1 surface search radar and 1 main gun FC radar KO
52: PA--Major engine damage and fire level 1
53: PA--Vibration--All engines and generators KO and all electronics KO and fire level 1. If the ship is larger than 10,000 tons, it will sustain the damage indicated by #52 instead of the above.
54-59: PA--Rudder KO
60-62: PA--Normal flooding and 1 propeller KO (same as 13)
63-64: 1 main gun mount KO
65: 1 main gun mount, 1 main gun director and 1 radar jammer KO.
66: A--1 main gun mount KO
67-69: 1 main SAM mount KO
70: 1 main SAM mount, 1 surface search radar KO
71-73: 1 main SSM mount KO
74: 1 main SSM mount KO, 1 main air search radar KO
75-77: 1 main ASW mount KO
78: 1 main ASW mount, 1 main SAM FC radar KO
79-80: 1 main gun mount KO
81: 1 main gun mount, 1 sec gun FC radar KO
82-83: 1 main SAM mount KO
84: 1 main SAM mount, 1 sec SAM FC radar KO
85-86: 1 sec weapons mount KO. The firing player determines what type of sec. mount is KO
87: 1 sec weapons mount KO, 1 main gun FC radar KO
88: All FC systems KO if rated D through G; otherwise, 1 main ASW mount KO
89: A--All FC systems KO
90-91: A--CIC KO
92-94: PA--1 main gun mount KO and normal flooding (same as 14)
95: PA--1 main gun mount KO and normal flooding, radar detector KO.
96: PA--1 main gun mount KO and normal flooding, 1 air search radar KO. If the target is a Soviet-designed ship, magazine explosion also.
97: PA--1 main gun mount KO and normal flooding, 1 main gun FC radar KO. If the target is a Soviet-designed ship, magazine explosion also.
98: PA--Sonar KO (same as 28)
99-00: PA--Magazine explosion (same as 21)

C. HULL DAMAGE

Number rolled/Result:

1-22: No damage
23: 1 generator KO
24: Minor engine damage
25: Radar detector KO
26: 1 main gun FC radar KO
27: 1 main SAM FC radar KO
28: 1 SSM FC radar KO
29: 1 air search radar KO
30: 1 sec SAM FC radar, radar jammer KO
31-34: Fire level 1
35: Gun FC system KO
36: SAM FC system KO
37: All FC systems KO if system is rated D,E,F,G; otherwise, only gun FC system KO
38-39: All FC systems KO if target is US ship; otherwise roll again.
40-44: Fire level 1
45-46: Fire level 3
47-48: 1 main gun mount KO
49-50: 1 main SAM mount KO
51-54: Normal flooding
55-56: PA--If Soviet-designed ship, magazine explosion if the armor is penetrated; if the armor is not penetrated or if the target is not Soviet-designed, normal flooding instead.
57-58: P--Sonar KO and normal flooding (same as 30)
59: P--Sonar KO and normal flooding, radar jammer KO
60-68: P--Minor flooding
69: PA--Heavy flooding; if ship is not a US design, all FC systems KO in addition to the heavy flooding.
70-76: PA--Heavy flooding
77: PA--Heavy flooding; if ship is not a US design, CIC KO in addition to the heavy flooding.
78: PA--Heavy flooding, 1 generator KO
79: PA--Heavy flooding, 1 sec SAM FC radar KO
80: PA--Heavy flooding, 1 sec gun FC radar KO
81: PA--Heavy flooding, 1 SSM FC radar KO
82: PA--Very heavy flooding, sonar and 1 main gun FC radar KO
83: PA--Very heavy flooding, 1 air search radar KO
84: PA--Very heavy flooding, 1 surface search radar and radar detector KO
85-86: PA--Very heavy flooding, 1 main gun mount KO (same as 27)
87-88: P--Rudder KO and normal flooding
89: PA--Normal flooding and fire level 1
90: PA--Normal flooding and fire level 3
91-94: PA--Normal flooding and minor engine damage and fire level 1
95: PA--Normal flooding and moderate engine damage and fire level 1
96: PA--Heavy flooding and moderate engine damage and fire level 1, 1 main gun FC radar KO
97: PA--Heavy flooding and major engine damage and fire level 1, 1 main SAM FC radar and sonar KO
98: PA--Very heavy flooding and major engine damage and fire level 1, one generator and 1 surface search radar and 1 air search radar KO
99: PA--Very heavy flooding, all engines and generators KO, all electronics KO, fire level 1. If the target ship is larger than 10,000 tons, it will sustain the damage indicated in #98 instead of the above.
00: PA--Magazine explosion

AA TABLE

Part I: Weapon Information

Section A--Guns:

#	Name of Weapon (NATO)	Range (AA) Hor	Range (AA) Vert	Basic Accuracy Rates: Missile Targets Small	Missile Targets Med	Missile Targets Lar	Aircraft Targets Small	Aircraft Targets Med	Aircraft Targets Lar
1	20mm	3"	Low	5	7	9	2	2	2
2	Vulcan	3"	Low	9	11	13	8	8	8
3	30-37mm	7"	Low	5	7	9	7	7	7
4	40mm Prox.	10"	Med	15	15	15	12	12	12
5	40mm	10"	Med	3	5	7	7	7	7
6	50-57mm	12"	Hi	16	16	16	13	13	13
7	76mm/62	12"	Hi	16	16	16	13	13	13
8	3"/50	12"	Hi	13	13	13	10	10	10
9	4"-4.5"	15"	Hi	17	17	17	14	14	14
10	5"/38	14"	Hi	13	13	13	10	10	10
11	5"/54*	18"	Hi	18	18	18	15	15	15
12	4.5"/MK 8	18"	[redacted]	19	19	19	16	16	16
		HI (V. LOW) BRITISH							
	(Soviet)								
13	23mm Gatl.	3"	Low	9	11	13	8	8	8
14	23-25mm	3"	Low	0	2	4	0	0	0
15	30mm Gatl.	4"	Low	9	11	13	9	9	9
16	30mm	4"	Low	3	5	7	3	3	3
17	37mm	6"	Med	0	1	3	1	1	1
18	Quad 45mm*	6"	Med	6	8	10	10	10	10
19	57mm/70	7"	Med	13	13	13	10	10	10
20	57mm/80	8"	Med	14	14	14	11	11	11
21	76mm	12"	Hi	16	16	16	13	13	13
22	85mm	8"	Hi	10	10	10	7	7	7
23	100mm	14"	Hi	13	13	13	10	10	10
24	130mm	21"	Hi	11	11	11	8	8	8

Notes:

1. Name of weapon and #--As indicated on the Gunnery Data Table, in many cases a number of guns have the exact same AA characteristics. However, since it is impractical to attempt to include the names of all of the guns in the game on the AA Table, each line on the table has been assigned a number (found in the column headed #). The Gunnery Data Table indicates the number of the line to be used for each gun. Use the line having the proper number even if the name of the gun being used does not appear in the Name of Weapon column.

2. Range:

a. Hor.--Horizontal range in inches.

b. Vert--Vertical range given as the maximum altitude level to which the gun can fire. Thus, a gun with a vertical range of "med" can fire at targets at surface skimming, very low, low, and medium altitude levels; it cannot fire at targets at high or very high altitude.

3. Basic Accuracy Rates: The basic accuracy rates for guns is based on whether the target is an aircraft or missile and its size. Thus, there are separate accuracy columns for each size of missile and aircraft.

4. Special characteristics: If an asterisk appears after the name of a weapon, one of the following special characteristics apply:

a. The information given in the line for the 5"/54 gun does not apply to the 5"/54 MK 45 gun mount found on some US ships. If a 5"/54 MK 45 is used as an AA gun, its maximum Vertical range is very low altitude. In addition, its basic accuracy rate against all missiles is 15, while its basic accuracy rate against all aircraft is 12. Its horizontal range is 18".

b. The accuracy rates given for the Soviet Quad 45mm are the accuracy rates for the entire quad mount, not for each individual gun.

5. The fact that certain guns are capable of manual override was considered when the table was designed. Therefore, there are no special adjustments or procedures that need to be followed if the gun being fired has manual override. The manual override rules given in the Gunfire Against Ships rules apply only when the guns are fired against ships. If a gun is used for AA purposes, it is not considered to be using manual override.

Section B: --SAM's:

Missile (NATO)	Min Range	Min Range Red.	Max Range Vert	Max Range Hor	Max Speed	Accuracy Missile	Accuracy Aircraft
Seasparrow*	2"	-1	Med	15"	90"	19	16
Seasparrow Imp (SS)*	3"(15")	-1(-4)	Med	30"	100"	20(17)	18(15)
Standard MR	5"	-2	VHi	45"	90"	20	18
Standard ER	7"	-2	VHi	75"	100"	20	18
Talos	20"	-3	VHi	195"	100"	18	13
Terrier	6"	-2	VHi	60"	90"	18	13
Tartar	5"	-2	VHi	45"	60"	18	13
Seacat (SS)*	1"(4")	-1(-2)	Med	7"	50"	18(15)	13(10)
Seaslug (SS)	5"(25")	-2(-4)	VHi	45"	60"	16(13)	11(8)
Seadart (SS)	7"(35")	-2(-4)	VHi	75"	90"	20(17)	18(15)
Seawolf (SS)	1"(1")	-0(-0)	Med	7"	90"	22(22)	21(21)
Masurca	9"	-2	VHi	90"	100"	18	13
Crotale*	1"	-0	Med	12"	80"	19	16
(SOVIET)							
SA-N-1*	5"	-2	VHi	48"	60"	15	8
SA-N-2	8"	-2	VHi	81"	100"	13	3
SA-N-3	6"	-1	VHi	57"	100"	18	13
SA-N-4(SS)*	2"(8")	-1(-2)	Med	15"	60"	19(16)	16(13)

Notes:

1. Min Range is the minimum range of the missile.

2. Min Range Red. is the reduction in accuracy rate of the missile if part of the target's flight path is within minimum range of the missile.

3. Max Range is the maximum range of the SAM:

a. Vert is the maximum vertical range of the SAM expressed in terms of altitude levels. Thus, if the Max Vert Range of a SAM is listed as "Med", the missile's maximum vertical range is medium altitude, and it cannot hit targets flying above this altitude. If the Max Vert Range is VHi, the SAM's maximum vertical range is the Very High altitude level, the highest possible altitude level in the game.

4. Max Speed is the speed of the SAM during each phase.

5. The accuracy columns give the base accuracy rates of the SAM's. There are two accuracy columns: use the Missile accuracy column when the SAM is fired at a missile target; use the Aircraft accuracy column when the SAM is fired at an aircraft target.

6. Some missiles have the entry (SS) next to their names. This indicates that the missile is capable of firing at targets flying at surface skimming altitude. Any missile which does not have this entry is assumed to have a minimum vertical range of very low altitude, and they cannot hit targets flying below this height. **Exception:** The SA-N-2 has a minimum vertical range of Low altitude and cannot hit targets at either surface skimming or very low altitude.

If a missile has an (SS) indicator, it will also have Min Range, Min Range Red, and Accuracy figures appearing in parentheses. Always use the figures in parentheses when the target is at surface skimming altitude; use the figures outside of the parentheses when firing at targets above surface skimming altitude.

7. A number of missiles have an asterisk appearing after their names. These missiles have launchers equipped with an optical sight which enables these missiles to be fired at targets which are not being tracked by the SAM's FC radar.

Part II: Accuracy Adjustments

Section A: Adjustments to Gunfire

1. Target is initially detected by radar or visual sighting during the phase of firing:

a. Basic adjustment: -5 if the gun's FC rating is B-H; No adjustment if the gun's FC rating is A.

b. Detection of target during a prior phase by radar detector:

1. No adjustment if the gun's FC rating is A.

2. +5 if the gun's FC rating is B-H and the radar detection rating of the detecting unit is A.

3. +3 if the gun's FC rating is B-H and the radar detection rating of the detecting unit is B.

c. Effects of the equipment on the detecting unit:

1. If the target is at surface skimming altitude or if the gun has an FC rating of A, there is no adjustment.

2. If the detecting unit is an aircraft or a ship equipped with a 3D radar capable of detecting the target, there is no adjustment. All TWS radars are considered to be 3D radars.

3. If (1) above does not apply, and the detecting unit is equipped with a 2D radar and height finder (and no 3D radar capable of detecting the target), -5 in addition to all other adjustments.

4. If (1) does not apply and the detecting unit is equipped with neither a height finder nor a 3D radar capable of detecting the target, -10.

d. Type of detection:

1. If the target was detected by radar, there is no additional adjustment.

2. If the target was not detected by radar, subtract an additional 5 from the accuracy rate.

3. If the detecting unit is a Soviet design, subtract an additional 3 from the accuracy rate unless the firing weapon's FC rating is A.

2. FC rating of the weapon:

A	+7
B	+5
C	+2
D	No adjustment
E	-2
F	+2
G	-4
H	-7

3. Range to the nearest point on the flight path:

Under 2"	No adjustment
2"-3"	-3
4"-5"	-5
6"-10"	-10
11"-15"	-15
16"+	-20

4. Target speed:

Under 10"	+8
10"-19"	+5
20"-29"	+2
30"-39"	No adjustment
40"-49"	-1
50"-59"	-2
60"-69"	-3
90"-109"	-5
200"+	-8

5. Distance between the firer and the second from the last target counter:

a. If this distance is greater than 75% of the AA gun's range, there is no adjustment.

b. If this distance is greater than 50% but less than or equal to 75% of the AA gun's range, subtract 1 from the accuracy rate.

c. If this distance is greater than 25% but less than or equal to 50% of the AA gun's range, subtract 3 from the accuracy rate.

d. If this distance is equal to or less than 25% of the AA gun's range, subtract 6 from the accuracy rate.

6. Range finder used:
   a. FC radar--No adjustment
   b. Search or TWS radar--subtract 3
   c. Gun director (optical)--subtract 5

7. If the target is a missile:

a. If the target is homing during the phase and the cruise altitude of the missile is higher than the vertical range of the AA gun, subtract 1 from the accuracy rate. **Note:** guns may fire at missiles which cruise above the gun's vertical range only during the phase the missile is homing.

b. If the target is a Harpoon during the phase of homing, subtract 2 from the accuracy rate.

c. If the target is an Exocet or Kormoran during the phase of homing, subtract 1 from the accuracy rate if the gun used is a 40mm prox. or larger than 50mm.

8. If the target is an aircraft:

a. If the aircraft dropped ordnance or sonobuoys during the preceding movement phase, add 3 to the accuracy rate.

b. If the target has a self-protective chaff dispenser, subtract 2 from the accuracy rate if the gun is radar controlled or using a search or TWS radar for range finding.

c. If the target has a maneuverability rating of 5 or higher, subtract 2.

d. If the target has a maneuverability rating of 2 or less, add 2 to the accuracy rate.

9. If the target's flight path is perpendicular to the firer, roll twice. The adjustments given in 1 and 5 above do not apply to the second roll.

10. Shifting targets:

a. FC rating of the AA gun:

A	-7
B	-8
C-F	-11
G	-14
H	-17

b. If the firer is Soviet, subtract an additional 2.

c. If the battery is not controlled by an FC radar, subtract an additional 2.

d. Equipment on the unit detecting the new target:

1. If the target is at surface skimming altitude or if the gun has an FC rating of A, there is no adjustment.

2. If the detecting unit is an aircraft or a ship equipped with a 3D radar capable of detecting the target, there is no adjustment. All TWS radars are considered to be 3D radars.

3. If (1) above does not apply, and the detecting unit is equipped with a 2D radar and height finder (and no 3D radar capable of detecting the target), subtract an additional 3.

4. If (1) does not apply and the detecting unit is equipped with neither a height finder nor a 3D radar capable of detecting the target, subtract an additional 6.

Section B: Adjustments to SAM Fire

1. If the target is initially detected during the phase of firing, the adjustments given in Section A, #1 apply to SAM's as well as guns.

2. If both the last and the second from the last target counters are within the minimum range of the SAM launcher, the SAM automatically misses the target.

3. If the distance between the firer and the nearest point on the target's flight path for that phase is less than the minimum range of the SAM, subtract the SAM's Min Range Red (given in Part 1 above) from the SAM's accuracy rate.

4. If either the last or the second from the last target counter is beyond the **maximum** range of the SAM, adjust the SAM accuracy rate as follows:

a. If either of these counters is beyond the maximum range of the SAM, subtract 3 from the accuracy rate.

b. If both of the counters are beyond the maximum range of the SAM, subtract 6.

Bear in mind that unless some point on the target's flight path for that phase is within maximum range of the SAM launcher, the SAM may not be fired.

5. Fire control used:

a. FC radar--No adjustment
b. Optical sight--Subtract 2.

6. If the target is a missile that is homing in on a ship during the phase of firing, measure the distance between the last and the second from the last (target) missile counters:

a. If the distance is greater than two-thirds of the **target missile's** speed, there is no adjustment.

b. If the distance is greater than one-third but less than or equal to two-thirds of the target missile's speed, subtract 5 from the accuracy rate.

c. If the distance is less than or equal to one-third of the target missile's speed, subtract 10 from the accuracy rate.

The missile's speed is always the speed given in the SSM Data table regardless of the distance actually moved by the missile during the phase.

7. If the target is an aircraft:

a. If the target has a self-protective chaff dispenser, subtract 2 from the accuracy rate if the SAM is radar guided.

b. If the target has a maneuverability rating of 5 or higher, subtract 2 from the accuracy rate.

c. If the target has a maneuverability rating of 2 or less, add 2 to the accuracy rate.

d. If the target aircraft dropped ordnance or sonobuoys during the phase, add 3 to the accuracy rate. In addition, measure the length of the segment of the flight path against which the firing is directed and compare it with the aircraft's speed for that phase (i.e., the distance travelled by the aircraft during the entire phase):

1. If the length of the segment is greater than two-thirds of the aircraft's speed, there is no additional adjustment.

2. If the length of the segment is greater than one-third but less than or equal to two-thirds of the aircraft's speed, subtract 5.

3. If the length of the segment is less than or equal to one-third of the aircraft's speed, subtract 10 from the accuracy rate.

8. Shifting targets--The adjustments given in Section A, rule 10 above apply to SAM's as well as guns.

9. If the SAM flies for more than one phase (only the Talos can do this) subtract 5 from the accuracy rate during the second phase of flight.

Part III. AA Accuracy Table

Accuracy Rate/Number Rolled	0	9	8	7	6	5	4	3	2	1
1	(1)									
2	(2)									
3	(3)									
4	(4)									
5	(5)									
6	(6)									
7	(7)									
8	1									
9	1	(3)								
10	1	(5)								
11	1	1								
12	1	1	(5)							
13	1	1	1							
14	1	1	1	1						
15	1	1	1	1	1					
16	1	1	1	1	1	1				
17	1	1	1	1	1	1	1			
18	1	1	1	1	1	1	1	1	1	

TORPEDO RESULTS CHART

I. TORPEDO COVERAGE AREA TABLE

Pattern	# of Torps	Range To 6"	7"-12"	13"-18"	19"-24"	25"-30"	31"-36"	37"+
Wide	2-3	2"	2½"	3"	3½"	4"	4½"	5"
	4-5	3"	4"	5"	6"	7"	8"	9"
Normal	2-3	1"	1½"	1½"	2"	2"	2½"	2½"
	4-5	1½"	2"	2½"	3"	3½"	4"	4½"
Tight	1	½"	½"	½"	½"	½"	½"	½"
	2-3	½"	1"	1"	1"	1"	1½"	1½"
	4-5	1"	1½"	1½"	1½"	2"	2"	2½"

Increase the coverage area by 1" for acoustic torpedoes.

II,a. TORPEDO ACCURACY TABLE

Width of coverage area	Base Accuracy Rate
½"	15
1"	13
1½"	11
2"	10
2½"	9
3"	8
3½"	7
4"	7
4½"	6
5"-5½"	5
6"-6½"	4
7"-7½"	3
8"-8½"	2
9"	1
Pattern Running	7

II,b. TORPEDO ACCURACY ADJUSTMENTS

Part 1. Non-homing torpedoes

1. Target ship is over 10,000 tons +3
2. Target ship is smaller than 1000 tons -3
3. Target speed:
   - a. 0 kts +3
   - b. 1-10 kts +2
   - c. 11-20 kts +1
   - d. 40-59 kts -1
   - e. 60-79 kts -2
   - f. 80 kts + -3
4. Target is presenting bow or stern aspect -5
5. Firing ship was Soviet design -1

Part 2. Acoustic homing torpedoes

1. Homing torpedo adjustment +6
2. Normal pattern -3
3. Tight pattern -6
4. Target speed:
   - a. 0 kts -3
   - b. 1-10 kts -2
   - c. 11-20 kts -1
   - d. 60-79 kts -1
   - e. 80 kts + -2
5. Target presenting bow aspect -2 unless torpedo is pattern running
6. Target presenting bow aspect and detected torpedo -6 unless torpedo is pattern running
7. Noise rating of target:
   - a. Very noisy +4
   - b. Noisy +2
   - c. Quiet -2
   - d. Very quiet -4
8. Target is using "foxer" -4
9. Firer was a Soviet designed ship -1
10. Torpedo is pattern running and the distance between the target and the torpedo counter is less than one-half of the torpedo's homing range (usually 4") +3
11. Target used "fishtailing" or "pillenwerfer" -2
12. Target is within 30" of a depth charge marker or a nuclear depth charge marker appears anywhere on the playing surface -4
13. Target is a conventional diesel-powered sub -1

Note: Adjustments 12 and 13 apply only if an ASW game is played. The "pillenwerfer" is a device carried only on submarines. Rules for submarines and anti-submarine warfare will appear shortly.

III. TORPEDO RESULTS TABLE

Accuracy Rate/Number Rolled	0	9	8	7	6	5	4	3	2	1
1	(1)									
2	(2)									
3	(3)									
4	(4)									
5	(5)									
6	(6)									
7	(7)									
8	1									
9	1	(3)								
10	1	(5)								
11	1	1								
12	1	1	(5)							
13	1	1	1							
14	1	1	1	1						
15	1	1	1	1	1					
16	1	1	1	1	1	1				
17	1	1	1	1	1	1	1			
18	1	1	1	1	1	1	1	1	1	

Note: If the adjusted accuracy rate is less than 1, treat the torpedo as if it has an accuracy rate of 1; if the adjusted accuracy rate exceeds 18, treat the torpedo as if its accuracy rate were 18.

TORPEDO DAMAGE TABLES

1,a. Target: Over 10,000 tons
Suit: Club or spade

Number/Result:

1 Heavy flooding, 1 sec gun mount KO, moderate engine damage, 1 generator KO, severe electronics damage.

2 Minor flooding, moderate engine damage, 2 generators KO, severe electronics damage.

3 Minor flooding, minor engine damage, 1 generator KO, minor electronics damage, fire level 1.

4 Minor flooding, minor engine damage, minor electronics damage.

5-6 Minor flooding.

7 Minor flooding, minor electronics damage.

8-9 Minor flooding.

10 Dud, no damage.

1,b. Target: Over 10,000 tons
Suit: Heart

Number/Result:

1 Normal flooding, minor electronics damage.

2,3 Minor flooding, fire level 1.

4,5 Minor flooding.

6,7 Minor flooding, minor electronics damage.

8,9 Minor flooding.

10 Dud, no damage.

1,c. Target: Over 10,000 tons
Suit: Diamond

Number/Result:

1 Normal flooding, rudder KO, one generator KO, minor electronics damage.

2 Minor flooding, propeller KO.

3 Minor flooding, rudder KO, fire level 1.

4,5 Minor flooding.

6,7 Minor flooding, minor electronics damage.

8,9 Minor flooding.

10 Dud, no damage.

II,a. Target: 1,000-10,000 tons
Suit: Club or Spade

Number/Result:

1 Very heavy flooding, very severe engine damage, 2 generators KO, very severe electronics damage.

2 Very heavy flooding, very severe engine damage, 2 generators KO, communications and data link KO, main gun director KO, 1 main gun mount KO, 1 main SAM mount KO, very severe electronics damage.

3 Minor flooding, major engine damage, severe electronics damage, 1 generator KO.

4 Normal flooding, major engine damage, fire level 2, very severe electronics damage, all generators KO.

5-7 Normal flooding, major engine damage, 1 generator KO, severe electronics damage.

8-9 Normal flooding, moderate engine damage, minor electronics damage.

10 Dud, no damage.

II,b. Target: 1,000-10,000 tons
Suit: Heart

Number/Result:

1 Magazine explosion in the bow if ship has at least one main gun or SAM mount in the bow. If the ship has no bow-mounted guns or SAM's, it sustains heavy flooding and fire level 3 in place of the magazine explosion.

2,3 Normal flooding, sonar KO, one main gun mount KO, one main SAM mount KO, one sec weapons mount KO (firer has his choice), severe electronics damage, 1 generator KO.

4,5 Heavy flooding, one main gun mount KO, one main SAM mount KO, two sec weapons mounts KO (firer has his choice), minor engine damage, very severe electronics damage, 1 generator KO, fire level 2.

6,7 Normal flooding, fire level 2, minor electronics damage.

8,9 Minor flooding, minor electronics damage.

10 Dud, no damage.

II,c. Target: 1,000-10,000 tons
Suit: Diamond

Number/Result:

1 Magazine explosion in the stern if the ship has at least one main gun or SAM mount there; otherwise, the ship sustains heavy flooding and rudder damage.

2,3 Normal flooding, rudder KO, 1 generator KO, severe electronics damage.

4,5 Normal flooding, propeller KO, severe electronics damage.

6,7 Heavy flooding, rudder KO, VDS sonar KO, minor engine damage, 2 generators KO, very severe electronics damage, fire level 1.

8,9 Minor flooding, minor electronic damage.

10 Dud, no damage.

III,a. Target: Under 1000 tons
Suit: Club or Spade

Number/Result:

1,2 Very heavy flooding, very severe engine damage, all electronics KO, all generators KO, all FC systems KO, steering circuits KO, communications and data link KO.

3-8 Normal flooding, very severe engine damage, very severe electronics damage, all generators KO.

9 Minor flooding, major engine damage, very severe electronics damage, 2 generators KO, fire level 4.

10 Dud, no damage.

III,b. Target: Under 1,000 tons
Suit: Heart

Number/Result:

1 Magazine explosion if the ship has at least one main gun or SAM mount in the bow. If not, the ship sustains heavy flooding, very severe electronics damage, severe engine damage, 1 generator KO instead.

2,3 Same as 1 above, but normal flooding instead of heavy flooding if the magazine does not explode.

4-7 Same as 1 above, but minor flooding instead of heavy flooding if the magazine does not explode.

8,9 Minor flooding, fire level 4, major engine damage, severe electronics damage, sonar KO, 2 generators KO.

10 Dud, no damage.

III,c. Target: Under 1000 tons
Suit: Diamond

Number/Result:

1 Magazine explosion if the target has at least one main gun or SAM mount in the stern. If not, the ship sustains heavy flooding, very severe electronics damage, severe engine damage, 1 generator KO instead.

2,3 Same as 1 above but normal flooding instead of heavy flooding if magazine does not explode.

4-7 Same as 1 above but minor flooding instead of heavy flooding if magazine does not explode.

8,9 Minor flooding, propeller damage, rudder KO, fire level 2, major engine damage, 2 generators KO, VDS sonar KO, severe electronics damage.

10 Dud, no damage.

TORPEDO DATA TABLE
(Anti-shipping Torpedoes)

Designation	Maker	Speed	Range	Role	Guidance	Homing	FD
E-14	Fr	1¼"	7½	DP	Un	A	1300
E-15	Fr	1¼"	17½"	DP	Un	A	1475
Z-16	Fr	1½"	15"	AS	Un	N	1600
SST-4	WG	1½"	30"	DP	Wire	A	1400
Mk 8	GB	2¼"	6¾"	AS	Un	N	1300
Mk 20	GB	1"	15"	DP	Wire	A	1000
Mk 14	US	1¾"	14"	AS	Un	N	1360
Mk 37	US	1¼"	30"	DP	Wire	A	1150
Mk 48	US	2½"	75"	DP	Wire	A	1400
Freedom	US	2"	16"	AS	Un	N	1470
21"	USSR	2½"	30"	DP	Wire	A	1500
21"	USSR	2½"	15"	DP	Wire	A	1500

Notes: Most of the table is self-explanatory. The speed figures represent the speed of the torpedo during each phase.

The roles are:

1. DP--Dual purpose. These torpedoes can be used against ships and submerged submarines.

2. AS--Anti-shipping. These torpedoes may be used only against surface vessels.

Guidance: Wire means the torpedo is wire guided; Un means the torpedo is unguided.

Homing: A means the torpedo is acoustic homing; N means the torpedo is not capable of acoustic homing. Note that unless a specific exception is made in the rules, all DP torpedoes may not use acoustic homing when used against surface ships; they must be set to operate in a non-homing mode.

FD rating--This represents the amount of flotation damage normally caused by a hit with the torpedo.

RADAR DETECTION TABLE

Searcher:	Surface Targets			Air Targets					
Ship	Small	Med	Large	SS	VLow	Low	Med	HI	VHI
Small	36"	45"	57"	30"	69"	213"	468"	618"	918"
Medium	51"	60"	72"	45"	84"	228"	483"	633"	933"
Large	57"	66"	78"	51"	90"	234"	489"	639"	939"
Aircraft									
Surf. Skim	30"	39"	51"	24"	63"	207"	462"	612"	912"
V. Low	69"	78"	90"	63"	102"	246"	501"	651"	951"
Low	213"	222"	234"	207"	246"	390"	645"	795"	1095"
Medium	468"	477"	489"	462"	501"	645"	900"	1050"	1350"
High	618"	627"	639"	612"	651"	795"	1050"	1200"	1500"
V. High	918"	927"	939"	912"	951"	1095"	1350"	1500"	1800"

The table above gives the maximum ranges at which radars can detect targets. The range is based on the size of the ship or the altitude of the aircraft using the radar and the size or altitude of the unit the radar is searching. To use the table, find the size of the ship using the radar, or if the radar is on an aircraft, find the altitude level of the aircraft in the left hand column of the table. Then, find the size or height of the unit against which the radar is being used at the top of the table. Cross-refer the two columns to determine the maximum radar detection range.

Note: Ship size:
1. Small--Under 1000 tons.
2. Medium--1000-10,000 tons.
3. Large--Over 10,000 tons.

Air targets include both aircraft and missiles. The altitude level listed as SS is surface skimming altitude.

RADAR ADJUSTMENT TABLE
Part 1: Adjustments to the number picked

1. Small target	+4
2. Medium target	No adjustment
3. Large target	-4
4. Missile target	+7
5. Target presenting neither bow nor stern aspect	-4
6. Unstabilized antenna	+2
7. Radar is continuous wave	-1
8. Radar is pulse doppler	-1
9. Radar is monopulse	-1
10. Radar has frequency agility	-1
11. Radar has MTI	-1
12. Reduced gain used	+4
13. Target was detected by the same unit by radar during the prior phase	-6
14. FC radar used to search	No detection unless card is black
15. Noise jamming used:	
a. Search & TWS radars	+12
b. FC radar	+10
c. Jamming unit has a radar detection rating of B	-2 unless d below also applies
d. Radar has frequency agility	-4
e. Jammer is airborne	+4

Note: Noise jamming is completely ineffective against CW radars, any FC radar used to launch torpedoes or control semi-active SSM's, and the radars mounted on all active homing SSM's that have already acquired targets.

16. Adjustments to airborne radars only:	
a. Target is at high altitude	+1
b. Target is at medium altitude	+2
c. Target is at low altitude	+3
d. Target is at very low altitude	+4
e. Target is at surface skimming altitude	+5
f. Target is at low altitude or lower, searcher at medium altitude	+8
g. Target is at low altitude or lower, searcher at high altitude	+12
h. Target is at low altitude or lower, searcher at very high altitude	+16
i. Target is at medium altitude, searcher is at high altitude	+8
j. Target is at medium altitude, searcher is at very high altitude	+12
k. Target is at high altitude, searcher is at very high altitude	+8
l. Radar has a look down rating of b	-4
m. Radar has a look down rating of a	-8

Part 2: Other adjustments to radar effectiveness

17. Target protected by chaff:	
a. Search radars	-25% from effectiveness of radar
b. FC radars	-50%
c. TWS radar searching	-25%
d. TWS radar tracking	-75%
e. Radar is pulse doppler	+25%
f. Radar has MTI	+25%
g. Radar is CW	+25%

18. Range or velocity gate pull off used:
   a. **FC radar** - Black card needed for successful jamming.

   b. **TWS radar** - Club, spade, or diamond results in successful jamming.

   c. **Radar has jittered PRF** - Spade needed for successful jamming of FC radar; black card needed for successful jamming of TWS.

   d. **Radar is monopulse** - Same as c above if jammer capable of jamming monopulse; otherwise, jamming always fails.

Note: To jam monopulse radar, there must be two jamming units within 3" of each other, or the jamming unit must be an aircraft at surface skimming or very low altitude, or the jamming unit must have cross eye.

19. Detecting false targets:
   a. **Search radar** - Spade only.
   b. **FC radar** - Club or spade.
   c. **Radar has jittered PRF** - Club or spade.

Note: The existence of false targets can be revealed if the bottom radar search counter placed beneath a unit is examined. This counter can be examined if the unit is detected and a card of the proper suit indicated above is picked.

Part 3: Radar Adjustment Table

Number Picked	Radar Strength 5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
1(-)	15"	30"	45"	60"	75"	90"	105"	120"	135"	150"	165"	180"	195"	210"	225"	240"
2	15"	30"	45"	60"	75"	90"	105"	120"	135"	150"	165"	180"	195"	210"	225"	240"
3	14"	28"	42"	56"	70"	84"	98"	112"	126"	140"	154"	168"	182"	196"	210"	224"
4	13"	26"	39"	52"	65"	78"	91"	104"	117"	130"	143"	156"	169"	182"	195"	208"
5	12"	24"	36"	48"	60"	72"	84"	96"	108"	120"	132"	144"	156"	168"	180"	192"
6	11"	22"	33"	44"	55"	66"	77"	88"	99"	110"	121"	132"	143"	154"	165"	176"
7	10"	20"	30"	40"	50"	60"	70"	80"	90"	100"	110"	120"	130"	140"	150"	160"
8	9"	18"	27"	36"	45"	54"	63"	72"	81"	90"	99"	108"	117"	126"	135"	144"
9	8"	16"	24"	32"	40"	48"	56"	64"	72"	80"	88"	96"	104"	112"	120"	128"
10	7"	14"	21"	28"	35"	42"	49"	56"	63"	70"	77"	84"	91"	98"	105"	112"
11	6"	12"	18"	24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"	90"	96"
12	5"	10"	15"	20"	25"	30"	35"	40"	45"	50"	55"	60"	65"	70"	75"	80"
13	4"	8"	12"	16"	20"	24"	28"	32"	36"	40"	44"	48"	52"	56"	60"	64"
14	3"	6"	9"	12"	15"	18"	21"	24"	27"	30"	33"	36"	39"	42"	45"	48"
15	2"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"
16+	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"	13"	14"	15"	16"

Number Picked	Radar Strength 85	90	95	100	125	150	175	200	225	250	275	300	325	350	375	400	5
1(-)	255"	270"	285"	300"	375"	450"	525"	600"	675"	750"	825"	900"	975"	1050"	1125"	1200"	15
2	255"	270"	285"	300"	375"	450"	525"	600"	675"	750"	825"	900"	975"	1050"	1125"	1200"	15
3	238"	252"	266"	280"	350"	420"	490"	560"	630"	700"	770"	840"	910"	980"	1050"	1120"	14
4	221"	234"	247"	260"	325"	390"	455"	520"	585"	650"	715"	780"	845"	910"	975"	1040"	13
5	204"	216"	228"	240"	300"	360"	420"	480"	540"	600"	660"	720"	780"	840"	900"	960"	12
6	187"	198"	209"	220"	275"	330"	385"	440"	495"	550"	605"	660"	715"	770"	825"	880"	110
7	170"	180"	190"	200"	250"	300"	350"	400"	450"	500"	550"	600"	650"	700"	750"	800"	100
8	153"	162"	171"	180"	225"	270"	315"	360"	405"	450"	495"	540"	585"	630"	675"	720"	90
9	136"	144"	152"	160"	200"	240"	280"	320"	360"	400"	440"	480"	520"	560"	600"	640"	80
10	119"	126"	133"	140"	175"	210"	245"	280"	315"	350"	385"	420"	455"	490"	525"	560"	70
11	102"	108"	114"	120"	150"	180"	210"	240"	270"	300"	330"	360"	390"	420"	450"	480"	60
12	85"	90"	95"	100"	125"	150"	175"	200"	225"	250"	275"	300"	325"	350"	375"	400"	50
13	68"	72"	76"	80"	100"	120"	140"	160"	180"	200"	220"	240"	260"	280"	300"	320"	40
14	51"	54"	57"	60"	75"	90"	105"	120"	135"	150"	165"	180"	195"	210"	225"	240"	30
15	34"	36"	38"	40"	50"	60"	70"	80"	90"	100"	110"	120"	130"	140"	150"	160"	20
16+	17"	18"	19"	20"	25"	30"	35"	40"	45"	50"	55"	60"	65"	70"	75"	80"	10

RADAR GUIDE
Part 1: Search Radars

ID #	Name	Maker	Type	Sur	SS	VLow	Basic Strengths Low	Med	Hi	VHi	Op	ECCM
1 / 1A	SPS-10 / SPS [redacted] 65	US	SS	25 /	15/25	20/30	-	-	-	-	P	M
2	SPS-12	US	AS	-	-	-	10	50	200	350	P	[redacted]
3	SPS-32/33	US	3D	-	-	-	75	150	250	325	P	[redacted]
4	SPS-37	US	AS	-	-	-	30	75	150	225	P	-
5	SPS-39	US	3D	-	-	10	25	50	75	100	P	-
6	SPS-40	US	AS	-	-	-	50	100	150	175	P	[redacted]
7	SPS-43	US	AS	-	-	-	50	150	250	350	P	[redacted]
8	SPS-48	US	3D	5	-	20	50	75	100	150	P	[redacted],F
9	SPS-49	US	AS	-	-	-	70	175	300	400	P	M [redacted],F
10	SPS-52	US	3D	-	-	15	35	60	80	125	P	[redacted],F
11	SPS-55	US	SS	40	20	30	-	-	-	-	P	M,F
12	SPS-58	US	3D	10	5	40	60	70	80	100	PD	F,J
13	SPQ-9	US	TWS	25	15	25	-	-	-	-	P	M [redacted],F,J
14	MK 87 & 92	US	AS/SS	25	15	25	25	25	25	25	PD	F,J
15	BPS-14 & 15	US	SS	15	10	10	-	-	-	-	P	M,F
16	Type 293	GB	AS/SS	20	10	35	75	75	-	-	P	[redacted]
17	Type 965	GB	AS	-	-	-	75	150	200	225	P	[redacted]
18	Type 975	GB	SS	45	20	25	-	-	-	-	P	M
19	Type 978	GB	SS	50	25	30	-	-	-	-	P	M,F
20	Type 992	GB	AS/SS	15	10	25	50	50	-	-	P	[redacted]
21	Type 992Q	GB	TWS	30	15	50	100	100	-	-	P	[redacted],F
22	Type 993	GB	TWS	25	10	40	85	85	-	-	P	[redacted]
23	Type 1006	GB	SS	60	30	40	-	-	-	-	P	M,F,J
24	STIR	GB	3D	10	5	40	100	175	250	300	P	[redacted],F,J
25	DRBV-13	Fr	AS/SS	15	5	20	30	50	-	-	P	[redacted]
26	DRBV-20	Fr	AS	-	-	-	10	50	200	300	P	[redacted]
27	DRBV-22	Fr	AS	-	-	-	30	75	125	150	P	-
28	DRBV-23	Fr	AS	-	-	-	50	100	150	175	P	[redacted]
29	DRBV-26	Fr	AS	-	-	-	20	50	100	125	P	[redacted],F
30	DRBV-50	Fr	AS/SS	20	10	30	70	70	-	-	P	[redacted]
31	DRBV-51	Fr	TWS	20	10	20	20	20	-	-	P	[redacted]
32	DRBI-10	Fr	3D	-	-	15	35	60	80	125	P	-
33	DRBI-23	Fr	3D	5	-	30	50	100	150	175	P	[redacted],F
34	Decca	Fr	SS	40	20	30	-	-	-	-	P	M,F
35	DRBN-32	Fr	SS	25	15	20	-	-	-	-	P	-
36	Triton	Fr	TWS	20	10	20	20	20	-	-	P	[redacted]
37	SPQ-2	It	AS/SS	20	10	15	20	20	-	-	P	[redacted],F
38	RAN-10	It	TWS	20	10	40	75	75	-	-	P	[redacted],F,J
39	RAN-3	It	AS	-	-	-	50	100	150	200	P	[redacted],F,J
40	3RM	It	SS	30	15	35	-	-	-	-	P	M,F,J
	SPY-1	US	3D	20	20	50	125	250	400	500		M,F,J

ID #	Name	Maker	Type	Sur	SS	VLow	Basic Low	Strengths Med	HI	VHI	Op	ECCM
41	SPS-6	It	AS	-	-	-	25	40	60	75	P	-
42	Search	Is	TWS	20	10	20	20	20	-	-	P	[illegible]
43	Band Stand*	USSR	SS	35	15	20	-	-	-	-	PD	F
44	Big Net	USSR	AS	-	-	-	25	100	150	200	P	-
45	Boat Sail	USSR	AS	-	-	-	50	80	150	175	P	-
46	Cross Bird	USSR	AS	-	-	-	-	30	150	275	P	-
47	Don	USSR	SS	25	15	20	-	-	-	-	P	-
48	Don Kay	USSR	SS	35	20	25	30	-	-	-	P	M,F
49	Flat Spin	USSR	AS	-	-	-	30	70	125	150	P	-
50	Head Net A	USSR	AS	10	-	10	30	70	125	150	P	[illegible]
51	Head Net C	USSR	3D	10	-	10	30	70	125	150	P	M
52	High Sieve	USSR	AS/SS	20	5	10	20	25	-	-	P	-
53	Knife Rest A	USSR	AS	-	-	-	10	50	70	90	P	-
54	Knife Rest B	USSR	AS	-	-	-	40	70	125	150	P	-
55	Plinth Net	USSR	3D	10	5	20	40	80	100	100	P	M
56	Pot Drum	USSR	SS	25	15	20	-	-	-	-	P	M
57	Pot Head	USSR	SS	20	10	20	-	-	-	-	P	M
58	Skin Head	USSR	SS	15	5	15	-	-	-	-	P	-
59	Slim Net	USSR	AS/SS	25	10	15	15	15	-	-	P	-
60	Snoop Plate	USSR	SS	15	5	10	-	-	-	-	P	-
61	Snoop Slab	USSR	SS	20	10	15	-	-	-	-	P	M
62	Snoop Tray	USSR	SS	20	10	15	-	-	-	-	P	-
63	Spoon Rest	USSR	AS	-	-	-	30	70	125	150	P	-
64	Square Tie*	USSR	SS	25	15	20	25	-	-	-	P	-
65	Strut Curve	USSR	AS	10	-	10	20	60	100	150	P	[illegible]
66	Top Sail	USSR	3D	10	5	30	60	100	100	100	P	M,F
67	Top Steer	USSR	AS/SS	35	20	30	40	40	-	-	P	[illegible],F
68	Top Trough	USSR	AS	-	-	-	20	75	225	325	P	[illegible]

Part 2: Fire Control Radars

ID	Name	Maker	Type	Strength	Op	ECCM	Use
69	SPG-35	US	FC	15	CS	-	Guns
70	SPG-49	US	FC	100	CW	-	Talos (SAM)
71	SPG-50	US	FC	20	CS	-	Guns
72	SPG-51	US	FC	30	CW	-	Tartar, Standard (SAM)
73	SPG-53	US	FC	25	CS	-	Guns
74	SPG-53(imp)	US	FC	25	M	M	Guns
75	SPG-55A	US	FC	25	CW	-	Terrier, Standard (SAM's)
76	SPG-55B	US	FC	50	CW	-	Standard ER (SAM)
77	SPG-60	US	FC	50	M	M,F	Guns
78	RTN-10	US	FC	20	CW	-	Seasparrow (SAM)
79	STIR*	US	FC	50	M	M,F	Guns, Standard (SAM)
80	Phalanx	US	FC	5	PD	F,J	Vulcan
81	RTN-10X	GB	FC	20	PD	F,J	Guns
82	GSW-22	GB	FC	5	CS	-	Seacat (SAM)
83	MRS-3	GB	FC	25	CS	-	Guns
84	Type 901	GB	FC	30	CW	-	Seaslug (SAM)
85	Type 909*	GB	FC	50	PD	F,J	Guns, Seadart (SAM)
86	Type 910*	GB	FC	5	M	M,F	Seawolf (SAM)
87	DRBC-31	Fr	FC	15	CS	-	Guns
88	DRBC-32	Fr	FC	25	CS	M	Guns
89	DRBR-51	Fr	FC	50	CW	-	Masurca (SAM)
90	Castor	Fr	FC	20	M	M,F	Guns
91	Pollux	Fr	FC	15	CS	M	Guns
92	RTN-10X	It	FC	20	PD	F,J	Guns
93	RTN-20X	It	FC	20	M	M,F	Guns
94	IFC*	Is	FC	20	PD	F,J	Guns, Gabriel (SSM)
95	Bass Tilt	USSR	FC	5	PD	F	Gatling guns
96	Drum Tilt	USSR	FC	5	CS	-	23-30mm guns
97	Egg Cup	USSR	FC	50	CS	-	4"-6" guns
98	Eye Bowl	USSR	FC	30	CS	-	SS-N-10/14 (SSM)
99	Fan Song	USSR	FC	50	CS	-	SA-N-2 (SAM)
100	Head Lights*	USSR	FC	30	CW	-	SA-N-3, SS-N-10/14
101	Hawk Screech	USSR	FC	10	CS	-	45-57mm guns
102	Muff Cob	USSR	FC	15	CS	-	57mm guns
103	Owl Screech	USSR	FC	25	CS	-	76mm guns
104	Peel Group	USSR	FC	35	CS	-	SA-N-1 (SAM)
105	Pop Group	USSR	FC	10	CS	-	SA-N-4 (SAM)
106	Scoop Pair	USSR	FC	50	CS	-	SS-N-3 (SSM)
107	Square Tie*	USSR	FC	25	CS	-	SS-N-2 & 11 (SSM)
108	Top Bow	USSR	FC	50	CS	-	Guns, SS-N-1 (SSM)
109	Punch Bowl	USSR	FC	50	PD	F	SS-N-12 (SSM)
110	Sun Visor	USSR	FC	50	CS	-	Guns
43	Band Stand*	USSR	FC	35	PD	F	SS-N-9 (SSM)

Note:

1. Type:
   - a. SS--Surface Search
   - b. AS--2D Air Search
   - c. 3D--3D Air Search
   - d. TWS--Track While Scan
   - e. SS/AS--Radar operates both as an air search and surface search radar simultaneously.
   - f. FC--Fire Control

2. Op.--Method of Operation:
   - a. P--Pulsed
   - b. CS--Conical Scan
   - c. PD--Pulse Doppler
   - d. CW--Continuous Wave
   - e. M--Monopulse

3. ECCM:
   - a. M--Moving Target Indicator (MTI)
   - b. F--Frequency Agility
   - c. J--Jittered PRF

4. Use: The type of weapon controlled by each fire control radar. The radar can control the fire only of the weapons indicated there unless the entry "Guns" appears in the Use column. Such radars are the main gun FC radars which can control the fire of SSM's and torpedoes as well as the main guns. All Soviet FC radars capable of controlling the fire of guns of 57mm or larger are main gun FC radars and can control the fire of torpedoes and some SSM's as well as the guns.

5. Special Radars: All of the radars given above which have an asterisk following their names have the following special characteristics:

   a. The Soviet Band Stand and Square Tie radars are capable of tracking targets for SSM's in addition to searching. They are treated just like TWS radars with the exception that during the phases in which they are used in a fire control mode, they may not be used to search for any opposing units other than the one they will attempt to track during that phase. Each of these radars may attempt to track only one target each phase. As with TWS radars, these Soviet radars cannot attempt to track a target during the phase it is initially detected. While successful target tracking by one of these radars is sufficient to allow accurate SSM firing, it does not result in very accurate gun fire. If the guns on ships equipped with either of these radars are fired at targets tracked solely by one of these radars, reduce the accuracy as if the target were tracked by only a TWS radar.

   b. The US STIR radar is capable of controlling both guns and SAM's. When used to control SAM's, noise jamming is completely ineffective, just as if it were a CW radar. Noise jamming will still affect its ability to track targets for guns; thus, it is possible that the radar can successfully control the launch of a SAM at a target while at the same time be unable to control the fire of guns at the same target due to noise jamming. This rule also applies to the British Type 909 radar (ID #85).

   c. The British Type 910 radar is listed as being a monopulse radar. However, in addition to the normal benefits accruing to monopulse, noise jamming is completely ineffective against the radar.

   d. Noise jamming is ineffective against the Israeli fire control radar (ID #94) when it is used to control the Gabriel SSM. Noise jamming will still affect the ability of the radar to control gun fire.

   e. The Soviet Head Lights radar is capable of being used for the SA-N-3 SAM and the SS-N-10/14 SSM. When used to track targets for the SS-N-10/14, the radar is assumed to operate in a pulse doppler mode rather than the normal CW mode. The radar may operate in both modes simultaneously during a single phase, although it may not track both air and surface targets during the same phase.

SSM DATA TABLE

Name	Range			Missile				Altitude			Mid-course	Tracking
(USSR)	Min	Max	Homing	Radar	ECCM	Size	Speed	of Flight	Accuracy	FD	Correction	Radar
SS-N-1	30"	390"	I	CS	-	L	30"	Med	4	1860	Y	FC,TWS
SS-N-2	10"	75"	R,J,I	CS	-	L	30"	Low	8	1490	Y	FC,TWS
SS-N-3	30"	1350"	R,J,I	CS	-	L	50"	VHi	6	1870	Y	#106
SS-N-9	20"	450"	R,J	PD	-	L	50"	Low	9	1490	Y	FC,TWS
SS-N-10/14	10"	75"	-	-	-	M	30"	Low	-	--	Y	#98, 100
SS-N-11	10"	87"	R,J,I	PD	-	L	30"	Low	9	1490	Y	FC,TWS
SS-N-12	30"	1400"	R,J,I	PD	-	L	90"	VHi	8	1870	Y	#106, 109
(NATO)												
Harpoon	9"	180"	R,J	PD	F,J	M	30"	SS	9	900	Y	FC,TWS
Exocet	6"	62"	R,J	[redacted]	F,[redacted]	M	30"	SS	9	880	N	FC,TWS
Gabriel MR	9"	33"	SA,J	-	-	M	20"	VLow	9	750	Y	#94
Gabriel ER	9"	66"	SA,J	-	-	M	20"	VLow	9	750	Y	#94
Otomat*	13"	130"	R,J	PD	F,J	M	30"	SS	9	600	Y	FC,TWS
Penguin*	3"	45"	I	-	-	M	25"	Low	7	400	N	FC,TWS
(SAM's)												
Seasparrow	15"	30"	SA	-	-	S	100"	VLow	4	100	-	#78
Terrier	40"	60"	SA	-	-	M	90"	Med	2	400	-	#75
Tartar	30"	45"	SA	-	-	M	60"	Med	2	400	-	#72
Standard MR	30"	45"	SA	-	-	M	90"	Med	4	400	-	#72, 75, 79
Standard ER	50"	75"	SA	-	-	M	100"	Med	4	400	-	#76
Seaslug	25"	45"	SA	-	-	M	60"	VLow	1	500	-	#84
Seadart	35"	75"	SA	-	-	M	90"	VLow	4	500	-	#85
SA-N-3	40"	57"	SA	-	-	M	100"	Med	2	400	-	#100
SA-N-4	8"	15"	SA	-	-	S	60"	VLow	3	100	-	#105
SA-N-1	32"	48"	SA			M	60"	MED	3	400		#104

Notes:

1. The missiles whose names appear beneath the word "SAM" in the "Name" column of the table are SAM's that are capable of being used against surface ships as if they were SSM's.

2. The seasparrow indicated on the table refers only to the improved seasparrow; the older seasparrow cannot be used against surface ships.

3. Range:
   - a. Min--Minimum range. The missiles are unable to hit targets that are closer to the launching vessel than the missile's minimum range.
   - b. Max--Maximum range of the missile.

4. Homing--The entries in this column indicate the types of homing available to each missile:
   a. R--Active radar homing
   b. J--Home on jamming
   c. I--Infra-red homing
   d. SA--Semi-active homing

5. The "Missile Radar" column indicates the type of radar used by the missile if it is set for active radar homing:
   a. CS--Conical scan
   b. PD--Pulse Doppler

6. The ECCM column indicates the type of ECCM built into the missile's radar:
   a. F--Frequency agility
   b. J--Jittered PRF

7. The "Size" column indicates the size of the missile:
   a. L--Large
   b. M--Medium
   c. S--Small

8. The "Speed" column indicates the speed of the missile during each phase.

9. The "Altitude of Flight" column indicates the altitude level at which the missile flies:
   a. Low--Low
   b. SS--Surface skimming
   c. VLow--Very Low
   d. Med--Medium
   e. VHi--Very High

10. The "Accuracy" column indicates the accuracy rate of the missile against ships.

11. The "FD" column gives the Flotation Damage rating of the missile. As explained in the Damage section of the rules, the FD rating is the amount of flooding that the missile would cause if the damage table indicates "Normal Flooding".

12. The "Mid-course Correction" column indicates if the missile is capable of mid-course correction: Y indicates the missile is capable of mid-course correction: N indicates that the missile is not capable of mid-course correction.

13. The "Tracking Radar" column of the table indicates the type of radar that must track the target before the missile can be launched. If "FC,TWS" appears, the missile may be fired against targets tracked by the main gun FC radar or any TWS radar. If the table indicates an ID number, only the radar whose ID number appears in the column is capable of tracking the target. Consult the Radar Guide to determine the names of the radars whose ID number appears in the table above.

14. Special Information:
   a. When SS-N-1's, SS-N-2's, or SS-N-3's home in on targets having displacements of less than 1000 tons, reduce the accuracy rate by 4. However, when determining if these missiles hit targets of this size, if the number rolled exceeds the adjusted accuracy rate by one the target ship sustains minor flooding and minor electronics damage in spite of the fact that the missile failed to hit it. If the number rolled exceeds the adjusted accuracy rate by two, the target sustains very minor flooding. Bear in mind that these results can occur only when the target is under 1000 tons; if the target is 1000 tons or larger, the normal accuracy rates apply, and the target will sustain no damage unless it is actually hit by the missile.

   b. Although Otomats and Penguins are listed as Medium-sized missiles on the table, when consulting the damage tables to determine the effects of hits with either of these missiles, use the "Small" missile damage tables to determine the results rather than the "Medium" missile tables.

   c. When any missile, other than Penguin and SS-N-1, is set for infra-red homing, reduce its accuracy rate by 2.

SSM VISUAL SIGHTING TABLE

Number Rolled	Maximum Sighting Range
1 or less	18"
2	12"
3	8"
4	6"
5	5"
6	4"
7	3"
8	2"
9	2"
0	0"

Adjustments:

1. Add 3" to the sighting range if the missile is Large unless the number rolled after adjustment is 0.

2. Subtract 3" from the sighting range if the missile is Small.

3. Add 6" to the sighting range if the missile is not a surface skimmer unless the number rolled after adjustment is 0.

4. Subtract 3 from the number rolled if the SSM was detected during a prior phase by any method. This adjustment applies only to units which actually detected the missile and all others in communication with a detecting unit.

SSM DAMAGE TABLES

1,a. Target: Over 10,000 tons
Missile Size: Large
Trajectory: High Angle

Number Rolled/Result:

1: Bridge KO, severe electronics damage, fire level 1, communications and data link KO.

2: Dud, minor electronics damage.

3: Minor weapons damage (if aircraft carrier, elevator damage instead of weapons damage), fire level 1, severe electronics damage.

4: Severe electronics damage, minor engine damage, roll again--if 1-5 is rolled, CIC KO in addition, if 6-0 rolled, all main FC systems KO.

5: Severe electronics damage, minor flooding, 1 generator KO, moderate engine damage.

6: Normal flooding, severe electronics damage, moderate engine damage.

7: Very heavy flooding, moderate engine damage, severe electronics damage.

8: Heavy flooding, moderate engine damage, 1 generator KO, minor electronics damage, fire level 1.

9: Minor flooding, very severe engine damage, 2 generators KO, severe electronics damage, fire level 2.

0: Magazine explosion.

1,b. Target: Over 10,000 tons
Missile Size: Large
Trajectory: Surface skimming

Number Rolled/Result:

1: Severe electronics damage, fire level 1, minor flooding.

2: Dud, minor electronics damage.

3: Minor weapons damage (if aircraft carrier, elevator damage instead of weapons damage), fire level 2, severe electronics damage, minor flooding.

4: Severe electronics damage, minor engine damage, minor flooding, roll again--if 1-5 is rolled, CIC KO; if 6-0 is rolled, all FC systems KO.

5: Severe electronics damage, minor flooding, 1 generator KO, moderate engine damage.

6: Minor flooding, severe electronics damage, minor engine damage.

7: Heavy flooding, moderate engine damage, severe electronics damage.

8: Normal flooding, minor engine damage, 1 generator KO, minor electronics damage, fire level 1.

9: Minor flooding, severe engine damage, 2 generators KO, severe electronics damage, fire level 2.

0: If Soviet-designed ships, magazine explosion; for all other ships, normal flooding, severe engine damage, 1 generator KO, fire level 1, severe electronics damage, rudder KO.

1,c. Target: Over 10,000 tons
Missile Size: Medium
Trajectory: High Angle

Number Rolled/Results:
1: Bridge KO, communications and data link KO.

2: Dud, minor electronics damage.

3: Minor weapons damage (if aircraft carrier, elevator damage instead), fire level 1, severe electronics damage.

4: Severe electronics damage, minor engine damage, roll again--if 1-5 is rolled, CIC KO; if 6-0 is rolled, all FC systems KO.

5: Minor electronics damage, minor flooding, minor engine damage.

6: Normal flooding, minor electronics damage, minor engine damage.

7: Very heavy flooding, moderate engine damage, 1 generator KO, minor electronics damage.

8: Heavy flooding, minor engine damage, fire level 1.

9: Minor flooding, severe engine damage, 1 generator KO, minor electronics damage, fire level 2.

0: Magazine explosion.

1,d. Target: Over 10,000 tons
Missile Size: Medium
Trajectory: Surface skimming

Number Rolled/Result:
1: Data link and communications KO, minor flooding.

2: Dud, minor electronics damage.

3: Minor weapons damage (if aircraft carrier, elevator damage instead), fire level 1, severe electronics damage, minor flooding.

4: Severe electronics damage, minor engine damage, minor flooding, roll again--if 1-5 is rolled, CIC KO; if 6-0 is rolled, all FC systems KO.

5: Minor flooding, minor electronics damage, minor engine damage.

6: Minor flooding, minor electronics damage.

7: Heavy flooding, moderate engine damage, 1 generator KO, minor electronics damage.

8: Normal flooding, fire level 1.

9: Minor flooding, moderate engine damage, 1 generator KO, minor electronics damage, fire level 2.

0: If Soviet-designed ship, magazine explosion; for all other ships, normal flooding, moderate engine damage, fire level 1, minor electronics damage, rudder KO.

1,e. Target: Over 10,000 tons
Missile Size: Small
Trajectory: High Angle

Number Rolled/Result:
1: Bridge KO.

2: Dud, no damage.

3: Minor weapons damage (if aircraft carrier, elevator damage instead), minor electronics damage.

4: Minor electronics damage, roll again--if 1-3 is rolled, CIC KO; if 4-6 is rolled, all FC systems KO; if 7-0 is rolled, communications and data link KO.

5: Minor flooding.

6: Normal flooding, minor electronics damage.

7: Very heavy flooding, minor engine damage.

8: Heavy flooding, minor engine damage, fire level 1.

9: Minor flooding, severe engine damage, 1 generator KO, minor electronics damage, fire level 1.

0: Magazine explosion.

1,f. Target: Over 10,000 tons
Missile Size: Small
Trajectory: Surface Skimming

Number Rolled/Result:
1: Minor electronics damage, minor flooding.

2: Dud, no damage.

3: Minor weapons damage, (if aircraft carrier, elevator damage instead), minor electronics damage, minor flooding.

4: Minor electronics damage, minor flooding, roll again--if 1-3 is rolled, CIC KO; if 4-6 is rolled, all FC systems KO; if 7-0 is rolled, data link and communications KO.

5: Minor flooding.

6: Minor flooding, minor electronics damage.

7: Heavy flooding, minor engine damage.

8: Normal flooding, fire level 1.

9: Minor flooding, moderate engine damage, 1 generator KO, minor electronics damage, fire level 1.

0: If Soviet-designed ship, magazine explosion; for all others, normal flooding, moderate engine damage, rudder KO.

2,a. Target: 1,000-10,000 tons
Missile Size: Large
Trajectory: High Angle

Number Rolled/Result:
1: Bridge KO, communications and data link KO, main gun director KO, all electronics KO, fire level 4, moderate engine damage.

2: Dud, very minor flooding, severe electronics damage, 1 generator KO, minor engine damage.

3: Major weapons damage (if aircraft carrier, minor weapons damage and elevator damage instead), fire level 4, all electronics KO, 1 generator KO, moderate engine damage.

4: CIC KO, very severe electronics damage, minor flooding, fire level 3, minor weapons damage, severe engine damage.

5: All FC systems KO, communications and data link KO, steering circuits KO, normal flooding, 2 generators KO, fire level 3, all electronics KO, moderate engine damage.

6: Normal flooding, very severe engine damage, minor weapons damage, 1 generator KO, very severe electronics damage.

7: Very heavy flooding, very severe electronics damage, 3 generators KO, communications and data link KO, rudder KO, very severe engine damage, fire level 2.

8: Heavy flooding, very severe engine damage, 2 generators KO, all electronics KO, communications and data link KO, major weapons damage, fire level 2.

9: Minor flooding, very severe engine damage, 3 generators KO, very severe electronics damage, fire level 2.

0: Magazine explosion.

2,b. Target: 1,000-10,000 tons
Missile Size: Large
Trajectory: Surface Skimming

Number Rolled/Result:
1: Communications and data link KO, all electronics KO, fire level 4, minor flooding, moderate engine damage.

2: Dud, severe electronics damage, 1 generator KO, minor engine damage.

3: Major weapons damage (if aircraft carrier, minor weapons damage, elevator damage instead), fire level 4, all electronics KO, 1 generator KO, moderate engine damage, minor flooding.

4: CIC KO, very severe electronics damage, minor flooding, moderate engine damage.

5: All FC systems KO, communications and data link Ko, steering circuits KO, normal flooding, 2 generators KO, fire level 3, all electronics KO, moderate engine damage.

6: Minor flooding, severe engine damage, minor weapons damage, 1 generator KO, very severe electronics damage.

7: Heavy flooding, very severe engine damage, 2 generators KO, all electronics KO, fire level 2, communications and data link KO.

8: Normal flooding, severe engine damage, 1 generator KO, all electronics KO, communications and data link KO, major weapons damage, fire level 2.

9: Minor flooding, severe engine damage, 2 generators KO, very severe electronics damage, fire level 2.

0: If Soviet-designed ship, magazine explosion; for all others, normal flooding, very severe engine damage, 3 generators KO, fire level 3, all electronics, rudder KO.

2,c. Target: 1,000-10,000 tons
Missile Size: Medium
Trajectory: High Angle

Number Rolled/Result:
1: Bridge KO, communications and data link KO, all electronics KO, minor engine damage, fire level 2.

2: Dud, very minor flooding, severe electronics damage.

3: Major weapons damage (if aircraft carrier, minor weapons damage, elevator damage instead), fire level 2, very severe electronics damage, 1 generator KO, moderate engine damage.

4: CIC KO, very severe electronics damage, minor flooding, moderate engine damage.

5: All FC systems KO, normal flooding, 1 generator KO, all electronics KO, moderate engine damage.

6: Normal flooding, very severe electronics damage, severe engine damage, minor weapons damage.

7: Very heavy flooding, severe engine damage, 2 generators KO, rudder KO, all electronics KO, fire level 1.

8: Heavy flooding, very severe engine damage, 1 generator KO, fire level 2, very severe electronics damage, minor weapons damage, communications and data link KO.

9: Minor flooding, very severe engine damage, 2 generators KO, very severe electronics damage, fire level 2.

0: Magazine explosion.

2,d. Target: 1,000-10,000 tons
Missile Size: Medium
Trajectory: Surface Skimming

Number Rolled/Result:
1: Communications and data link KO, all electronics KO, fire level 2, minor engine damage, minor flooding.

2: Dud, severe electronics damage.

3: Major weapons damage (if aircraft carrier, minor weapons damage and elevator damage instead), fire level 2, very severe electronics damage, 1 generator KO, moderate engine damage, minor flooding.

4: CIC KO, very severe electronics damage, minor flooding, minor engine damage.

5: All FC systems KO, normal flooding, 1 generator KO, fire level 2 all electronics KO, moderate engine damage.

6: Minor flooding, very severe electronics damage, moderate engine damage, minor weapons damage.

7: Heavy flooding, severe engine damage, 2 generators KO, all electronics KO, fire level 1.

8: Normal flooding, severe engine damage, 1 generator KO, very severe electronics damage, minor weapons damage, communications and data link KO, fire level 2.

9: Minor flooding, severe engine damage, 2 generators KO, very severe electronics damage, fire level 2.

0: If Soviet-designed ship, magazine explosion; for all other ships, normal flooding, very severe engine damage, 2 generators KO, fire level 2, all electronics KO, rudder KO.

2,e. Target: 1,000-10,000 tons
Missile Size: Small
Trajectory: High Angle

Number Rolled/Result:
1: Bridge KO, communications and data link KO, very severe electronics damage, fire level 1.

2: Dud, very minor flooding, minor electronics damage.

3: Minor weapons damage (if aircraft carrier, elevator damage instead), fire level 2, severe electronics damage, minor engine damage.

4: CIC KO, severe electronics damage, moderate engine damage.

5: All FC systems KO, minor flooding, 1 generator KO, very severe electronics damage, fire level 1, minor engine damage.

6: Normal flooding, severe electronics damage, moderate engine damage, minor weapons damage.

7: Very heavy flooding, severe engine damage, very severe electronics damage.

8: Heavy flooding, severe engine damage, 1 generator KO, severe electronics damage, fire level 2, communications and data link KO.

9: Minor flooding, very severe engine damage, 2 generators KO, very severe electronics damage, fire level 2.

0: Magazine explosion.

2,f. Target: 1,000-10,000 tons
Missile Size: Small
Trajectory: Surface Skimming

Number Rolled/Result:
1: Communications and data link KO, very severe electronics damage, fire level 1, minor flooding.

2: Dud, minor electronics damage.

3: Minor weapons damage (if aircraft carrier, elevator damage instead), fire level 2, severe electronics damage, minor engine damage, minor flooding.

4: CIC KO, severe electronics damage, minor engine damage, minor flooding.

5: All FC systems KO, minor flooding, 1 generator KO, very severe electronics damage, fire level 1, minor engine damage.

6: Minor flooding, severe electronics damage, minor engine damage, minor weapons damage.

7: Heavy flooding, severe engine damage, very severe electronics damage.

8: Normal flooding, moderate engine damage, 1 generator KO, severe electronics damage, fire level 2, communications and data link KO.

9: Minor flooding, severe engine damage, 2 generators KO, very severe electronics damage, fire level 2.

0: If Soviet-designed ship, magazine explosion; for all others, normal flooding, severe engine damage, 1 generator KO, fire level 1, very severe electronics damage, rudder KO.

3,a. Target: Under 1000 tons
Missile Size: All
Trajectory: All

Number Rolled/Result:
1: Dud, minor flooding, very severe electronics damage, very severe engine damage, very severe weapons damage.

2-9: Heavy flooding, all electronics KO, all weapons KO, very severe engine damage, fire level 10.

0: Magazine explosion.

SHIP CHARACTERISTICS TABLE
Part 1: Basic Ship Data

Ship	Maker	Type	Disp	Speed	Prop	Noise	Aircraft	Special
Nimitz	US	CVN	81600	35	N	VN	100	4C;A(H-L;D-L)
Kitty Hawk	US	CV	60100	32.5	S	N	85	4C;A(H-L;D-L)
Enterprise	US	CVN	75700	32.5	N	VN	95	4C;A(H-L;D-L)
Forrestal	US	CV	60000	35	S	VN	85	4C;A(D-L)
Midway	US	CV	51000	32.5	S	VN	75	2C;A(D-L)
Virginia	US	CGN	11000	35	N	N	2	-
California	US	CGN	10000	35	N	N	-	-
Truxton	US	CGN	8200	32.5	N	N	1	-
Belknap	US	CG	6570	35	S	A	1	-
Bainbridge	US	CGN	7600	32.5	N	N	-	-
Leahy	US	CG	5670	35	S	A	-	-
Albany	US	CG	13700	32.5	S	N	2	P
Long Beach	US	CGN	14200	35	N	N	1	-
Coontz	US	DDG	4700	35	S	A	-	-
Charles F. Adams	US	DDG	3370	32.5	S	A	-	-
Spruance	US	DD	7800	32.5	G	VQ	2	M
Forrest Sherman	US	DD	2800	32.5	S	N	-	-
Oliver H. Perry	US	FFG	3605	27.5	G	Q	2	-
Brooke	US	FFG	2640	27.5	S	A	1	-
Knox	US	FF	3011	27.5	S	Q	1	-
Garcia	US	FF	2620	27.5	S	A	1	-
Tarawa	US	LHA	39300	22.5	S	N	30	2C
Ark Royal	GB	CV	43000	32.5	S	VN	36	2C,P,A(B-M;D-M)
Hermes	GB	CV	23900	27.5	S	N	24	OC,P,A(D-L)
Invincible	GB	CCH	19500	27.5	G	A	15	OC
Tiger	GB	C	9500	30	S	N	4	P,A(B&T-M;D-L)
Bristol	GB	DDG	6100	30	COSAG	Q	1	-
County	GB	DDG	5440	32.5	COSAG	Q	1	M
County (mod)	GB	DDG	5440	32.5	COSAG	Q	1	M
Sheffield	GB	DDG	3150	27.5	G	Q	1	M
Amazon	GB	FFG	2000	32.5	G	Q	1	-
Amazon (mod)	GB	FFG	2000	32.5	G	Q	1	-
Weapons	GB	FFG	3500	30	G	Q	2	-
Leander	GB	FF	2500	27.5	S	A	1	-
Leander ASW	GB	FF	2500	27.5	S	A	1	-
Leander SSM	GB	FFG	2500	27.5	S	A	1	-
Rothesay	GB	FF	2380	25	S	A	1	M
Tribal	GB	FF	2300	25	COSAG	A	1	M
Kiev	USSR	CVSG	35000	32.5	S	A	40	OC
Moskva	USSR	CHG	15000	30	S	A	18	OC
Kynda	USSR	CLG	4500	35	S	N	-	-
Kresta I	USSR	CLG	5140	35	S	N	1	-
Kresta II	USSR	CLG	6000	32.5	S	A	1	-
Kara	USSR	CLG	8200	32.5	G	A	1	-
Sverdlov	USSR	CA	15420	35	S	VN	-	P,A(B&T-M;D-L)
Kotlin SAM	USSR	DDG	2850	35	S	N	-	P
Kildin	USSR	DDG	3000	35	S	A	-	-
Kildin MOD	USSR	DDG	3000	35	S	A	-	-
Krupny	USSR	DDG	3650	35	S	A	-	-
Kanin	USSR	DDG	3650	35	S	A	-	-
Kashin	USSR	DDG	3750	35	G	A	-	-
Kashin MOD	USSR	DDG	3750	35	G	A	-	-
Krivak	USSR	DDG	3200	32.5	G	A	-	-
Skory	USSR	DD	2600	35	S	N	-	P
Skory MOD	USSR	DD	2600	35	S	N	-	P
Kotlin	USSR	DD	2850	35	S	N	-	P
Kola	USSR	FF	1500	30	S	N	-	P
Riga	USSR	FF	1250	27.5	S	N	-	P
Petya	USSR	FF	950	30	CODOG	A	-	-
Mirka	USSR	FF	950	32.5	CODOG	A	-	-
Nanuchka	USSR	PGG	780	32.5	D	A	-	-
Komar	USSR	PGG	80	40	D	A	-	-
Osa	USSR	PGG	165	35	D	A	-	-
Kronstadt	USSR	FF	310	25	D	N	-	P

SHIP CHARACTERISTICS TABLE
Part 2: Weapons

Name	Main Gun	Main SAM	SSM	Main ASW	Sec gun	Sec SAM	Torps	Sec ASW
Nimitz	-	3xSeasparrow;D	-	-	-	-	-	-
Kitty Hawk	-	2xStandard;D	-	-	-	-	-	-
Enterprise	-	2xSeasparrow;D	-	-	-	-	-	-
Forrestal	-	2xSeasparrow;D	-	-	-	-	-	-
Midway	3Sx5"/54;F	-	-	-	-	-	-	-
Virginia	2Sx5"/54;B	2xStandard;B	2FxHarpoon;B	2xASROC;B	-	-	2T;B	-
California	2Sx5"/54;B	2xStandard;B	2FxHarpoon;B	1xASROC;B	-	-	2D;B	-
Truxton	1Sx5"/54;D	1xStandard;D	2FxHarpoon;D	1xASROC;D	-	-	2D;D	-
Belknap	1Sx5"/54;D	1xStandard;D	2FxHarpoon;D	1xASROC;D	-	-	2T;D	-
Bainbridge	-	2xStandard;D	2FxHarpoon;D	1xASROC;D	-	-	2T;D	-
Leahy	-	2xStandard;D	2FxHarpoon;D	1xASROC;D	-	-	2T;D	-
Albany	2Sx5"/38;F	2xTalos;D	-	1xASROC;D	-	2xTartar;D	2T;D	-
Long Beach	-	1xTalos;D	4DFxHarpoon;D	1xASROC;D	-	2xStandard;D	2T;D	-
Coontz	1Sx5"/54;D	1xStandard;D	2FxHarpoon;D	1xASROC;D	-	-	2T;D	-
Adams	2Sx5"/54;D	1xTartar;D	-	1xASROC;D	-	-	2T;D	-
Spruance	2Sx5"/54;B	1xSeasparrow;B	2FxHarpoon;B	1xASROC;B	-	-	2T;D	-
Forrest Sherman	3Sx5"/54;D	-	-	-	-	-	2D;D	-
O.H. Perry	1Sx76mm;B	1xStandard;B	-	1xASROC;B	-	-	2T;D	-
Brooke	1Sx5"/38;F	1xStandard;D	2FxHarpoon;D	1xASROC;D	-	-	2T;D	-
Knox	1Sx5"/54;D	1xSeasparrow;D	2FxHarpoon;D	1xASROC;D	-	-	2D;D	-
Garcia	2Sx5"/38;F	-	-	1xASROC;D	-	-	2T;D	-
Tarawa	3Sx5"/54;B	2xSeasparrow;B	-	-	6Sx20mm;H	-	-	-
Ark Royal	-	-	-	-	-	-	-	-
Hermes	-	2xSeacat;D	-	-	-	-	-	-
Invincible	-	1xSeadart;B	-	-	-	-	-	-
Tiger	1Dx6";D	2xSeacat;D	-	-	1Dx3"/70;D	-	-	-
Bristol	1Sx4.5";B	1xSeadart;B	-	1xIkara;B	-	-	-	1xLimbo;B
County	2Dx4.5";B	1xSeaslug;B	-	-	2Sx20mm;H	2xSeacat;B	-	-
County (mod)	1Dx4.5";B	1xSeaslug;B	2DxExocet;B	-	2Sx20mm;H	2xSeacat;B	-	-
Sheffield	1Sx4.5";B	1xSeadart;B	-	-	2Sx20mm;H	-	2T;D	-
Amazon	1Sx4.5";B	1xSeacat;B	-	-	2Sx20mm;H	-	-	-
Amazon (mod)	1Sx4.5";B	1xSeawolf;A	2DxExocet;B	-	2Sx20mm;H	-	2T;D	-
Weapons	2Sx40mm;H	2xSeawolf;A	2DxExocet;B	-	-	-	2T;D	-
Leander	1Dx4.5";C	1xSeacat;C	-	1xLimbo;C	-	-	-	-
Leander ASW	2Sx40mm;H	2xSeacat;B	-	1xIkara;B	2Sx20mm;H	-	-	1xLimbo;B
Leander SSM	2Sx40mm;H	2xSeacat;B	2DxExocet;B	-	2Sx20mm;H	-	1T;D	-
Rothesay	1Dx4.5";C	1xSeacat;C	-	1xLimbo;C	2Sx20mm;H	-	-	-
Tribal	2Sx4.5";C	2xSeacat;C	-	1xLimbo;C	2Sx20mm;H	-	-	-
Kiev	2Dx76mm;B	2xSAN-3;B	4DxSSN-12;B	1xSUWN-1;B	8x23mmGat;A	2xSAN-4;B	2Q;D	2xM25;B
Moskva	2Dx57mm;D	2xSAN-3;D	-	1xSUWN-1;D	-	-	2Q;D	2xM25;D
Kynda	2Dx76mm;E	1xSAN-1;E	2FxSSN-3;E	2XM25;E	-	-	2T;E	-
Kresta	2Dx57mm;D	2xSAN-1;D	2DxSSN-3;D	2xM25;D	-	-	2Q;D	2xM45;D
Kresta II	2Dx57mm;D	2xSAN-3;D	2FxSSN-10;D	2xM25;D	4x30mmGat;A	-	2Q;D	2xM45;D
Kara	2Dx76mm;C	2xSAN-3;C	2FxSSN-10;C	2XM25;C	4x23mmGat;A	2xSAN-4;C	2Q;C	2xM45;C
Sverdlov	4Tx152mm;G	-	-	-	6Dx100mm;G	-	-	-
Kotlin SAM	1Dx130mm;E	1xSAN-1;E	-	2xM25;E	1Fx57mm;E	-	1Q;E	-
Kildin	4Fx57mm;E	-	1SxSSN-1;E	2xM25;E	-	-	2D;E	-
Kildin MOD	2Dx76mm;D	-	2DxSSN-11;D	2xM25;D	4Fx57mm;D	-	2D;D	-
Krupny	4Fx57mm;E	-	2SxSSN-1;E	2xM25;E	-	-	2T;E	-
Kanin	2Fx57mm;E	1xSAN-1;E	-	3xM25;E	4Dx30mm;E	-	2Q;E	-
Kashin	2Dx76mm;D	2xSAN-1;D	-	2xM25;D	-	-	1Q;D	2xM45;D
Kashin MOD	2Dx76mm;D	2xSAN-1;D	2DxSSN-11;D	2xM25;D	4x23mmGat;A	-	1Q;D	-
Krivak	2Dx76mm;D	2xSAN-4;D	1FxSSN-10;D	2xM25;D	-	-	2F;D	-
Skory	2Dx130mm;G	-	-	2xDC;G	1Dx85mm;G	-	2Q;G	-
Skory MOD	2Dx130mm;E	-	-	2xM25;E	5Sx57mm;E	-	1Q;E	2xDC;E
Kotlin	2Dx130mm;E	-	-	2xDC;E	4Fx45mm;E	-	2Q;E	-
Kola	4Sx100mm;G	-	-	2xDC;G	2Dx37mm;H	-	1T;G	-
Riga	3Sx100mm;G	-	-	2xM25;G	2Dx37mm;H	-	1T;G	2xDC;G
Petya	2Dx76mm;E	-	-	4xM25;E	-	-	1Q;E	2xDC;E
Mirka	2Dx76mm;D	-	-	4xM25;D	-	-	1Q;D	-
Nanuchka	1Dx57mm;C	1xSAN-4;C	2TxSSN-9;C	-	-	-	-	-
Komar	1Dx25mm;H	-	2SxSSN-2;H	-	-	-	-	-
Osa	2Dx30mm;D	-	2DxSSN-2;D	-	-	-	-	-
Kronstadt	1Sx85mm;G	-	-	2xDC;G	2Sx37mm;H	-	-	-

DATA NOTES:

1. Ship types: All CV's, CVN's, LHA's, LPH's, CCH's, CVSG's, and CHG's are considered aircraft carriers. All other vessels having a designation beginning with C are cruisers. All vessels whose designations begin with D are destroyers; all vessels whose designation begins with F are frigates. Any vessel having a G in its designation is equipped with guided missiles; any vessel having an N in its designation is nuclear powered. The H in the designation of some aircraft carriers indicates they are helicopter carriers. LPH's and LHA's are small carriers designed to support amphibious landings.

2. "Disp" is the vessel's displacement in tons.

3. "Speed" is the vessel's maximum speed in knots.

4. "Prop" is the vessel's type of propulsion:
   a. N--Nuclear
   b. S--Steam
   c. D--Diesel
   d. G--Gas Turbine
   e. COSAG, COSOG, etc.--Combined propulsion

5. "Noise" is the noise rating of the vessel. This rating affects the ability of the vessel to be hit by acoustic torpedoes and the ability of sonar to detect it:
   a. VN--Very Noisy
   b. N--Noisy
   c. A--Average
   d. Q--Quiet
   e. VQ--Very Quiet

SHIP CHARACTERISTICS TABLE
Part 3: Electronics

Name	Radar Det	ECM Equip.	ECM Rating	Data Link	Sonars	Radars
Nimitz	B	J,C	B	Y	-	1,7,78(3),8
Kitty Hawk	B	J,C	B	Y	-	1,7,H,10,75(4)
Enterprise	B	J,C	B	Y	-	1,2,3,12,78(2) 8,9,
Forrestal	B	J,C	B	Y	-	1,7,H,12,78(2)
Midway	B	J,C	B	Y	-	1,7,H,12,69(3)
Virginia	B	J,C	B	Y	8	6,8,11,72(2),13,77
California	B	J,C	B	Y	7	1,6,8,13,72(4),77
Truxton	B	J,C	B	Y	7	1,6,8,73,76(2)
Belknap	B	J,C	B	Y	7	1,6,8,73,76(2)
Bainbridge	B	J,C	B	Y	5	1,4,10,71(2),75(4)
Leahy	B	J,C	B	Y	5	1,4,8,71(2),76(4)
Albany	B	J,C	B	Y	5	1,7,8,H,70(4),72(4),69(2)
Long Beach	B	J,C	B	Y	5	1,2,3,69(2),70(2),75(2)
Coontz	B	J,C	B	Y	6	1,4,8,73,76(2)
Adams	B	J,C	B	N	6	1,5,6,10,72,73 (5 or 10) + 72
Spruance	B	J,C	B	Y	8	6,11,13,77,78
Forest Sherman	B	J,C	B	N	5	1,4,69,73
O. H. Perry	B	J,C	B	N	9,11	9,11,14,79
Brooke	B	J,C	B	N	7	1,10,69,72
Knox	B	J,C	B	N	7,11,12	1,6,78,73
Garcia	B	J,C	B	N	7	1,6,69
Tarawa	B	J,C	B	Y	-	1,6,10,13,77,78(2)
Ark Royal	B	J,C	B	N	-	17(2),H(2),18
Hermes	B	J	B	N	-	17,18,22,82(2)
Invincible	A	J,C	A	Y	18	17,20,23,85(2)
Tiger	B	J	B	N	-	17,20,H,18,82(2),83(2)
Bristol	A	J,C	A	Y	17	17,19,21,23,85
County	A	J,C	A	Y	15	17,18,21,H,82(2),83,84(2)
County (mod)	A	J,C	A	Y	15	17,18,21,H,82(2),83,84(2)
Sheffield	A	J,C	A	Y	15	17,21,23,85(2)
Amazon	A	J,C	A	Y	15	19,21,82(2),81
Amazon (mod)	A	J,C	A	Y	15	19,21,81,86
Weapons	A	J,C	A	Y	18	23,86(2)
Leander	B	J	B	N	15,19	17,18,22,82,83
Leander ASW	A	J,C	A	Y	15,19	18,22,82(2)
Leander SSM	A	J,C	A	Y	15,19	17,18,22,82(2)
Rothesay	B	J	B	N	16	18,22,82,83
Tribal	B	J	B	N	17	16,17,18,82,83
Kiev	A	J,C	A	Y	36,39	48,66,67,95(4),100(2),109(2),103(2),105(2)
Moskva	B	J,C	B	N	36,39	48(2),51,66,100(2),102(2)
Kynda	B	J	B	N	35	47(2),50(2),103,104,106(2)
Kresta I	B	J,C	B	N	35	44,47(2),51,55(2),102(2),104(2),106
Kresta II	B	J,C	B	N	36	48(2),51,66,95(2),96(2),100(2),102(2)
Kara	B	J,C	B	Y	36,39	48(2),51,66,95(2),96(2),100(2),103(2),105(2)
Sverdlov	B	J	B	N	32	47,53,59,110(2)
Kotlin SAM	B	J	B	N	35	47,51,101,104,110
Kildin	B	J	B	N	35	47,49,59,101(2),108
Kildin MOD	B	J	B	N	35	47,51,101(2),103
Krupny	B	J	B	N	35	47,50,101(2),108
Kanin	B	J	B	N	35	47(2),51,96(2),101(2),104
Kashin	B	J,C	B	N	35	47(2),50(2),103(2),104(2)
Kashin MOD	B	J,C	B	N	35,39	47(2),50(2),103(2),104(2),96(2)
Krivak	B	J,C	B	N	36,39	47,51,98(2),103,105(2)
Skory	B	J	B	N	32	46,47(2),52,108
Skory MOD	B	J	B	N	32	47,59,101(2),108
Kotlin	B	J	B	N	32	47,59,110,101(2)
Kola	-	-	-	N	32	46,58,110
Riga	B	J	B	N	35	47,59,110
Petya	B	J	B	N	35	47,59,101
Mirka	B	J	B	N	35	47,59,101
Nanuchka	B	J	B	N	-	43,47,102,105
Komar	-	-	-	N	-	64/107
Osa	-	-	-	N	-	64/107,96
Kronstadt	-	-	-	N	32	58

6. "Special";

a. Any number followed by "C" indicates the number of aircraft catapults on the vessel. Thus, "4C" indicates the vessel has four catapults.

b. A vessel having "A" followed by an entry in parentheses is armored. The entry in the parentheses indicates the armored positions and the thickness of armor at those positions. The possible positions are:

1. H--Hull (on US carriers only)
2. B--Belt
3. D--Deck
4. T--Turret

The thickness of armor is either "L" for light, or "M" for medium. **Example:** "A(B&T-M;D-L)" indicates the vessel has medium armor on the belt and turret, and light deck armor.

c. A vessel having an entry of "P" has poor shock mountings.

d. A vessel having an entry of "M" is very maneuverable.

7. "Aircraft" is the number of aircraft normally carried on the vessel. All vessels other than aircraft carriers may carry only helicopters.

8. The weapons found on each vessel appear in the "Main Gun", "Main SAM", "SSM", "Main ASW", "Sec gun", "Sec SAM", "Torps", and "Sec ASW" columns. Each entry consists of a number which indicates the number of mounts followed by the type of weapon in the mount. This is followed by a semi-colon and a capital letter; the capital letter indicates the FC rating of the weapon. **Example:** "2xStandard;D" indicates that the vessel has two SAM launchers capable of firing Standard missiles, and the FC rating of these launchers is D.

The entries for guns, SSM's and Torpedo tubes have a capital letter inserted between the number of mounts and the type of weapon. This capital letter indicates the number of guns or tubes in each mount:

S--Single; one gun or torpedo or SSM tube in each mount.
D--Double; two guns or torpedo or SSM tubes in each mount.
T--Triple; three guns or tubes in each mount.
F--Quadruple; four guns or tubes in each mount.
Q--Quintuple; five guns or tubes in each mount.

Example: A main gun entry indicating "2Dx4.5";B" means that the vessel is equipped with two twin 4.5" mounts (i.e., a total of four guns in two mounts), and these guns have an FC rating of B.

Example: A torpedo tube entry indicating "2T;D" means the vessel has two triple torpedo mounts (a total of six tubes) having an FC rating of D. The types of torpedoes are not listed in the table; they are found in the notes below.

9. The "Radar Det" column indicates the Radar Detection Rating (A or B) of the vessel. Similarly, the "ECM Rating" column gives the ship's ECM rating.

10. The "ECM Equip" column indicates the ECM equipment found on the vessel. "J" indicates the vessel has a radar jammer; "C" indicates the vessel has chaff launchers.

11. The "Data Link" column indicates if the vessel has data link. An entry of "Y" indicates the vessel has data link; an entry of "N" indicates the vessel does not have data link.

12. The "Sonars" and "Radars" columns indicate the identification numbers of all of the sonars and radars carried on the vessel. To determine the names of the sonars and radars, look up the ID numbers in the Radar and Sonar Guides. **Example:** If the table indicates the vessel has radar #1, check the Radar Guide to determine which radar has that ID number. As indicated on the Radar Guide, radar #1 is the SPS-10. **Note:** The Sonar Guide does not appear in this rule book; it will appear in the Warship Commander supplement, along with detailed aircraft and anti-submarine rules.

If a number in parentheses appears after an entry in the "Radar" column, it indicates the number of that type of radar carried by the vessel. **Example:** "76(2)" indicates that the vessel carries two radars #76, i.e., it is carrying two SPG-55B radars.

If the letter "H" appears as an entry in the "Radar" column, it indicates that the vessel is equipped with a height-finding radar in addition to the other radars indicated.

NOTES ON THE US NAVY:

1. The US Navy is currently refitting most of its ships to make them more effective. This makes it rather difficult to state with certainty the equipment found on most ships, as the refitting is being done on a ship by ship basis rather than by class. Therefore, it is quite likely that some ships of a class may have the new equipment while others do not.

2. Currently, many ships have had Harpoon SSM mounts installed, so the data tables given above indicate that these missiles are carried. It is possible that some ships in the classes listed as carrying Harpoons may not yet have received them. Harpoons are usually carried in racks mounted on the sides of the ships. Each mount holds four missiles, and usually no reloads are carried. The SAM launcher on the O.H. Perry class frigate is capable of launching Harpoons, and it will probably carry the usual complement of eight missiles.

The Harpoon racks being installed on the Truxton, Belknap, Bainbridge, and Leahy classes are replacing the 3"/50 guns originally mounted on these vessels, while Harpoons will probably replace the 5"/38 guns on the Long Beach. All of these ships had two batteries of guns, one battery on each side. Each battery on the Truxton and Belknap classes consisted of one 3"/50 gun, while each battery on the Bainbridge and Leahy classes had two 3"/50 guns. Each battery on the Long Beach consists of one 5"/38 gun. Each battery on the Truxton, Belknap, and Long Beach classes had one SPG-35 fire control radar to control its fire, while the fire of the guns on the Bainbridge and Leahy classes was controlled by SPG-50's. It is probable that these radars were removed from the Belknap and Truxton classes when the missiles were installed, but the radars on the other ships may remain.

3. In addition to Harpoons, the following equipment is being installed, or will probably be soon installed, on US ships:

a. NTDS will probably be installed on most frigates not already equipped with it.

b. The 20mm Vulcan-Phalanx system is about to be installed on a number of ships. The O.H. Perry will receive one of these, while the Belknap and Spruance classes may receive as many as four (two per side). Other ships may also be fitted with this weapon. Each Vulcan-Phalanx system consists of one 20mm gatling gun and one Phalanx fire control radar; the fire control rating of the system is A. It can only fire at aircraft and missiles, never at ships.

c. The new 8"/55 gun will replace the forward 5"/54 gun mount on the Spruance class.

d. A new electronics suite, called DPEWS, is scheduled to be fitted onto all ships. This system will have the following effects:

1. Knox class frigates and smaller auxiliary vessels will have their radar detection rating increased to A when the opposing radar is a fire control radar. The radar detection rating remains B when the opposing radar is a search radar.

2. All other frigates and destroyers will have their radar detection ratings increased to A. This rating will apply to all radars.

3. All cruisers, carriers, and large auxiliaries will have both their radar detection ratings and their ECM ratings increased to A in all cases.

4. Other information:

a. There are two types of Standard missiles: the medium range (MR), and the extended range (ER). Assume that ships equipped with the SPG-55B FC radar (radar #76) are equipped with the extended range missile, while all other have the MR model.

b. All CV's and CVN's can carry both fixed wing aircraft as well as helicopters. All other ships listed as carrying aircraft may carry only helicopters. **Exception:** LHA vessels can carry Harrier fighter-bombers in place of helicopters. Assume that each Harrier counts as two aircraft for the purpose of determining the maximum number of aircraft that can be carried on the ship.

The standard helicopter carried on cruisers, destroyers, and frigates is the SH-2. The SH-3 can be carried only by aircraft carriers, amphibious assault ships and the Spruance class destroyers. If a Spruance carries the SH-3, it can carry only one helicopter, not two.

Normally, US aircraft carriers carry two squadrons of fighters (either F-4's or F-14's), two attack squadrons of A-7's, and one heavy attack squadron of A-6's. Each of these squadrons consists of twelve aircraft. In addition, a composite squadron consisting of four-plane elements of various types of aircraft is also carried. The types of aircraft constituting the composite squadron include EA-6's, KA-6's, E-2's, and RF-8's or RA-5C's. On most carriers, an ASW squadron of ten S-3's or eight SH-3's has been added. Frequently, the number of reconnaisance aircraft, transports, and tankers is reduced in order to accomodate these additional planes.

c. The 5"/54 guns carried on the Virginia, California, Spruance, and Tarawa classes are the Mk 45 models; all other 5"/54 guns are Mk 42 models.

d. The Standard SAM launchers on the Virginia, Truxton, and Belknap classes also launch ASROC missiles; these vessels have no separate ASROC launcher. If a damage table indicates that either a SAM or ASW launcher is knocked out, one of these launchers will be knocked out.

e. The Standard SAM launcher on the C.F. Adams and O.H. Perry classes can fire Harpoons in addition to Standards.

f. Harpoon missiles can be carried in any ASROC box launcher in addition to the normal Harpoon racks.

g. The gun carried on the O.H. Perry is the Italian 76mm/62 produced by OTO-Melara.

One ship has had one main turret removed and replaced by a SA-N-4 launcher; in addition, four twin 30mm mounts (eight guns) have been added. Another ship has had two main turrets removed and replaced by one SA-N-4 launcher and eight twin 30mm mounts. Both of these vessels carry only the following radars: 68,47(2),110,96(2 in the first ship, 4 in the second), 105. The second ship carries two helicopters. Both ships carry chaff launchers. The FC ratings of the AA gun and SAM mounts are the same as the main gun FC rating.

One ship, the Dzerzhinsky, has had one aft main turret replaced by a SA-N-2 mount. This ship carries the following radars: 44,47(2),50,99,H,110.

Two of the unmodernized Sverdlovs carry two quintuple torpedo mounts in addition to the normal armament.

7. Some Kotlin SAM's mount four twin 30mm mounts (eight guns) and two Drum Tilt radars in addition to their normal equipment. For damage purposes, treat these weapons as additional secondary guns. Their FC rating is the same as the main gun's.

8. Unmodernized Skory class destroyers carry either seven 37mm guns in single mounts or eight 37mm guns in twin mounts in addition to the armament listed in the table. For damage purposes, treat these guns as additional secondary guns. They have an FC rating of H.

9. There are two variants to the Petya frigate in addition to the type listed in the table. The first variant, called the Petya II, has had two MBU-2500 mounts replaced by a quintuple torpedo mount (thus, these vessels have two torpedo mounts, but only two MBU-2500's). Another variant, Petya III, is the same as Petya II except that all of its MBU-2500's were removed as well as the aft 76mm mount. These were replaced by a VDS sonar (#39).

10. The torpedoes carried on all Petyas are the 16" ASW torpedo; they cannot be used against surface ships. All other ships carry the 21" torpedo which can be used against both ships and submarines.

11. The SS-N-10/14, although technically an ASW weapon, sustains damage as if it were an SSM mount. For this reason, the entry for this weapon always appears in the SSM column. The entry for this weapon is "SSN-10".

12. The Square Tie radar is listed as both radar #64 and radar #107. Both of these entries on the Radar Guide apply to the same radar which can be used for both search and fire control.

13. Aircraft:

a. The Kiev normally carries about 25 Yak-36's, and 15 helicopters. Most of the helicopters are Ka-25A's, but some are Ka-25B's.

b. All of the aircraft carried on the Moskva are Ka-25A helicopters.

c. All other ships capable of carrying aircraft carry either Ka-25A's or Ka-25B's.

14. The Kiev has two elevators; the Moskva has three.

15. The chaff launchers found on Soviet ships are short range. Chaff shells are available for Soviet guns.

16. SS-N-11's may be loaded into SS-N-2 launchers, and any radar capable of tracking targets for the SS-N-2 is also capable of tracking targets for the SS-N-11. Similarly, SS-N-12's may be loaded into SS-N-3 launchers, and any radar capable of tracking targets for the SS-N-3 may be used for the SS-N-12 as well. Therefore, ships listed as carrying SS-N-2's may carry SS-N-11's instead, and ships listed as carrying SS-N-3's may carry SS-N-12's in their place.

DEFINITIONS

The following are definitions of some of the terms used in the game:

1. Actual counter: This phrase occurs in the Aircraft rules. An aircraft's Actual Counter is the counter used to mark the point at which the aircraft's move ended. The Actual Counter of an aircraft may also be called the "last aircraft counter".

2. ASM: Air to surface missile--An anti-shipping missile launched from aircraft.

3. ASW: Anti-submarine warfare.

4. Battery: The battery is the basic unit of firing. It consists of one or more gun or SAM mounts which are engaging the same target. All of the weapons forming a battery must be of the same type, located on the same ship, and controlled by no more than one FC radar. During each phase, each gun mount may be part of only one battery, and a battery may consist of more than one gun mount. However, no more than one SAM mount may be in each battery, but each SAM mount may form up to two batteries as indicated in the AA rules found in the SSM section.

5. Duplicate counter: This phrase occurs in the Aircraft rules. An aircraft's "duplicate counter" is the counter used to mark the point at which an aircraft's move began. It may also be called the second from the last aircraft counter. The point at which an aircraft ends its move is marked by the aircraft's "Actual Counter".

6. FC: Fire Control. This phrase may be used to describe a radar or a computer-based weapons control system.

7. Flight Path For The Phase: The AA rules given in the SSM section and the Aircraft section frequently refer to the target's "flight path for the phase". When a missile is fired upon, its flight path for the phase (of firing) is the straight line between the last and second from the last SSM counter.i.e., the path travelled by the missile during its last move before firing began. Similarly, when an aircraft is fired upon, its flight path for the phase is the line between the aircraft's actual and duplicate counter (i.e., the line between the counter marking the beginning of the aircraft's move and the counter marking its end).

8. Flotation Points: This is the unit of measurement of flooding damage. When the number of flotation points received by a ship exceeds its Maximum Flotation Allowance, it sinks.

9. Gatling: Gatlings are multi-barreled rapid firing AA guns.

10. Last Missile Counter: The SSM rules frequently refer to the last missile counter and the second from the last missile counter. The last missile counter is the counter used to mark the end of the missile's latest move (i.e., it is the last missile placed on the playing surface).

11. Last Target Counter: The AA rules given in the SSM and Aircraft rules sections frequently refer to the "last target counter". If the target of the AA weapons is a missile, the "last target counter" is the same as the "last missile counter"; if the target is an aircraft, the "last target counter" is the aircraft's Actual counter.

12. Moving Evasively: This is a type of ship movement described in the movements rules in which a ship's forward movement is reduced, but the chance of it being hit by gunfire is also reduced.

13. Radar Search Counters: These are two counters which are placed face down beneath each counter which represents either an actual unit or a "dummy". These counters are used to provide the opposing player information about the unit if it is detected by his radar. The top "Radar Search Counter" will indicate "blip" if the counter beneath which it is placed represents an actual unit or a false target generated by a deception jammer. The top counter placed beneath "dummies" which are not used as false targets must be blank. The bottom "Radar Search Counter" will indicate "Real" if it is placed beneath an actual unit; if the counter is placed beneath a "dummy", it must be blank regardless if deception jamming is being used.

14. Second From The Last Missile Counter: The second from the last missile counter is the counter which marked the end of a missile's prior move, which of course, is the point at which its current move begins.

15. Second From The Last Target Counter: This term is used in the AA rules. If the target of the AA weapons is a missile, the second from the last target counter is the same as the second from the last missile counter. If the target is an aircraft, the second from the last target counter is the same as the aircraft's "Duplicate Counter".

16. SSM: Surface to surface missiles--These are anti-shipping missiles launched from ships.

17. Target: A target is any unit against which a weapon is directed. In addition, a target is also a unit which is the object of an attempt at visual sighting, radar search or radar tracking.

18. Tracking: A unit which has had a radar operating in a fire control mode used against it is considered to be tracked. Units may also be tracked by sonar; the process of sonar tracking is explained in the ASW rules.

19. TDD: Tactical Data Display--This is a form used to record each unit's equipment, damage, and contacts.

Name/Des. 1
Disp. 2 (3) 7
Speed: 4 Current: 5 Prop: 6
Weapons: Main FC Sec FC
Gun
SAM
SSM 8 TT
ASW
ECM: 9
Radar Det. 10 Data Link 11
Radars: Search 12
FC
Sonars: 13
Contacts: Radio Det
Radar 14
Radar Det
Sonar
Weapons Launch:
Torp
SSM 15
Gun
Damage: Flood 16 Fire
Spec:
Damage Control: 17

Name/Des. SPRUANCE/M-1
Disp. 7800 (1950, 3900, 5850, 7800) M,VQ
Speed: 325 Current: Prop: GAS
Weapons: Main FC Sec FC
Gun 2x5"/54 B
SAM 1x SEASPARROW B
SSM 8x HARPOON B TT 2x3 D
ASW 1x ASROC B
ECM: JAMMER B CHAFF B
Radar Det. B Data Link DL
Radars: Search SPS-40, SPS-55, SPQ-9
FC SPG-60, RTN-10
Sonars: SQS-53
Contacts: Radio Det
Radar
Radar Det
Sonar
Weapons Launch:
Torp
SSM
Gun
Damage: Flood Fire
Spec:
Damage Control: 1 2 3

USING THE TDD

Sample ship TDD's are given above. The one on the left is a skeleton form in which all sections are numbered. A description of the information which should appear in each numbered section is given below. The TDD given on the right is a completed TDD for the Spruance class destroyer.

1. In section 1, write in the name of the vessel and the designation on the counter used to represent it. The designation must include both the number and the size indicated on the counter.

2. Write the displacement of the vessel in the Disp. box of the form.

3. Determine the Maximum Flotation Allowance of the ship as described in the Damage rules. In box 3, insert the number that is equal to 25% of the ship's Maximum Flotation Allowance, the number equal to 50% of the Maximum Flotation Allowance, the number equal to 75% of the Maximum Flotation Allowance, and finally, the Maximum Flotation Allowance itself. Bear in mind that according to the Damage Rules, whenever the amount of flotation damage sustained by a ship equals or exceeds any of these amounts, the ship sustains additional, special damage.

4. In section 4, insert the maximum speed of the ship.

5. In section 5, insert the current speed of the ship at the beginning of the phase if the ship's current speed is less than its maximum speed.

6. In box 6, write the type of propulsion used by the ship.

7. In box 7, indicate any special characteristics which may apply to the ship. The special characteristics are found in the "Special" column of the Ship Characteristics Table.

8. In box 8, indicate the types of weapons carried, the number of each, and their FC ratings in the appropriate spaces. As weapons are knocked out, cross them out, or write in the number of remaining weapons of that type in place of the number of weapons the vessel originally had. Note that section 8 is divided into two columns: the column on the left contains information about the main weapons, while the column on the right contains the information about t secondary weapons. Since there are no secondary SSM's, the numb of torpedo tubes is inserted in the right-hand column of the SSM lir

9. In the left-hand portion of this box, indicate "jammer" and the Ship ECM rating if the ship has a radar jammer; in the right-hand portio indicate "Chaff" if the ship has chaff launchers. If these devices a knocked out, cross them out.

10. Insert the ship's Radar Detection Rating in box 10.

11. If the vessel has data link, write DL in this box. If the data link knocked out, cross it out. If the data link fails to function during phase, circle it for that phase to remind you that it is not operating that time.

12. Insert the names of all of the radars carried and the number each. Cross them out as they are knocked out.

13. Insert the names of all sonars carried in box 13.

14. When the ship detects a vessel by radar detector, radio detecto radar, sonar, or visual sighting, write the designation of the detecte unit on the proper line of this section. The designations will include t size, (represented by S for small units, M for medium, or L for larg units), the type (a for aircraft, m for missile; no type designation required for ships), and the number on the counter. Units detecte visually are inserted on the radar line and underlined. If a unit detected by passive sonar, insert the designation on the sonar line, b enclose the entry in parentheses; units detected by active sonar a not enclosed in parentheses. If a unit is tracked by sonar, underline designation.

15. On line 15, insert the launch information required when t weapons indicated there are launched. If there is not enough spa there, continue the required information on a piece of paper.

16. In block 16, keep a record of the flotation damage, fire, and oth damage unable to be recorded elsewhere on the TDD. Record t

flotation damage in the "Flood" section, and the fire in the "Fire" section. If using the damage control rules, there must be two entries in each of these sections: one entry to indicate the total amount of such damage the ship has sustained; the other to indicate the amount of uncontrolled flooding or fire on board the ship. In the "Special" section of the block, record the damage sustained by the ship which cannot be recorded elsewhere. Bear in mind that due to space limitations, this box will probably have to be constantly erased.

17. In block 17, insert the number of damage control parties on the ship. During the damage control segments of the phases, indicate in the block the task to which each damage control party is assigned.

EXPANDED SEQUENCE OF PLAY TABLE
(Surface Actions)

A. Initial Movement Phase:
1. The player moving first will move any or all of his ships as desired.
2. Determine if any collisions occur, and if so, determine the damage.

B. Initial Combat Phase: Note: All activities indicated for the combat phase will be conducted by both players (or teams) at the same time.

1. Visibility Segment:
   a. Both players may turn on searchlights or fire starshells if desired.

   b. Both players will resolve all visual sighting except the sighting of SSM's.

2. Electronic Search Segment:
   a. Determine which units have operating data link.

   b. Both players will place "Radar" counters (and "Noise" counters if desired) next to all units using such devices during the phase.

   c. Both players will resolve the use of radar detectors.

   d. Players may choose to have units which detected an opposing radar with a radar detector (and those units connected by data link to a detecting unit) use ECM. Any of these units which use noise jamming are immediately detected by all opposing radar detectors.

   e. Resolve all active homing SSM target acquisition.

   f. Resolve the visual sighting of SSM's.

   g. Resolve the use of all searching radars.

3. ECM vs homing SSM's:
   a. Resolve the use of ECM against homing SSM's.

4. Gunnery Segment:
   a. Resolve the fire of each gun and SAM battery at SSM's as follows:
      1. Resolve the use of the battery's FC radar.

      2. Determine if the battery shoots down its target.

      3. If the target is shot down, the battery may shift fire to another target. Resolve the fire against the additional targets by repeating steps (1) and (2).

   b. Resolve the fire of each gun battery at surface targets as follows:
      1. Resolve the use of the battery's FC radar and the ECM used against it.

      2. Determine the number of hits the battery scores on the target.

      3. Determine the damage caused by the hits.

5. SSM Segment:
   a. Determine if the currently homing SSM's hit their targets.

   b. Determine the damage caused by such SSM's.

   c. Move all previously launched SSM's which are still flying.

   d. Attempt to launch new missiles as follows:
      1. Resolve the use of the battery's FC radar and the ECM used against it.

      2. Launch the missiles in the battery if all requirements are met.

6. Torpedo Segment:
   a. Determine if any of the previously launched torpedoes hit their targets.

   b. Determine the damage caused by the torpedo hits.

   c. Move all previously launched torpedoes which are still running.

   d. Launch new torpedoes if the requirements are met.

   e. Determine if the newly launched torpedoes are visually sighted by the opposing force.

7. Damage Control Segment:
   a. Both players assign tasks to their damage control parties.

   b. Both players resolve all attempts at damage control.

C. Initial Communications Phase:
1. Both players will resolve all attempts at short range and long range communication. Also, resolve the use of any radio detectors and jammers being used against these attempts.

D. Second Movement Phase:
1. The player moving second will move any or all of his ships as desired.

2. Determine if any collisions occur, and if so, determine the damage.

E. Second Combat Phase:
Repeat all of the steps indicated in B above.

F. Second Communications Phase:
Repeat all of the steps indicated in C above.

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